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NOTES FOR THE MONTH.

A THIRD Interim Report,* dealing with meat, poultry and eggs, has now been issued by the Departmental Committee on Distribution and Prices of Agricultural Produce. The first and second reports, on milk and milk products and on fruit and vegetables respectively, were noticed in the *Journal* for May and July.

The Committee obtained a large amount of information from representatives of producers, distributors, and consumers, and, in addition, received from a great number of retailers detailed particulars of their general trading experience.

It is pointed out that unlike milk, fruit and vegetables, which normally reach the consumer in the same form as that in which they leave the farm, live stock are subjected to various processes, such as the slaughtering of the animals, the dressing and cutting up of the carcasses, and in the case of bacon, curing and smoking. These necessary processes add to the complexities and costs of distribution: they may also increase the number of intermediaries between the farm and the home.

It is plainly of importance to both producers and consumers that these intermediary operations should be carried out as efficiently and inexpensively as possible. It is further of importance that there should be a better understanding of the relationship of the agencies through which agricultural produce is distributed, and of the constituent elements in the price which the consumer pays. All engaged in live stock or poultry production should therefore purchase and study the Report. Diagrams show the different courses, sometimes direct, sometimes through the hands of middlemen, which meat, poultry and eggs may take in their journey from the farm to the home.

* The Report can be obtained through any bookseller or direct from H.M. Stationery Office, Imperial House, Kingsway, W.C.2. (Cmd. 1927, price 5s.).

In concluding its Report the Committee says, as regards meat :—

“We have investigated the conditions of the system of marketing and distributing meat in this country, and have set out the methods and costs in all their details so far as we have been able to ascertain them. It appears that, generally, the intermediaries concerned have increased their charges *pro rata* to their expenses, or to the change in the value of the meat with which they are dealing. We observe that retailers, however, have gone a little further and appear definitely to have increased their percentage margin of profit during recent years, and, as a class, to have improved their relative financial status in the community. We have also drawn attention to certain marketing, processing and distributive charges which might with advantage be revised.

We have indicated such improvements in the marketing of fat stock and meat as appear to us to be practical, and we earnestly commend these to the producers and distributors concerned. We are of opinion that meat traders, both wholesale and retail, should endeavour to give the best possible service in the distribution of home-produced meat, and, in particular, that they should endeavour to popularise the consumption of those cuts of the carcasses which are now in poor demand. We are further of opinion that retailers should make an effort to reduce the price of the home-produced article at an early date, especially if an effective demand for the poorer cuts can be successfully stimulated and the loss on them reduced. Producers can assist distributors, and themselves obtain considerable benefit, by marketing the type of animal which experience shows is best suited to the requirements of the retail trade.”

As regards poultry and eggs the Committee concludes its Report as follows :—“The outstanding feature of the poultry industry as we see it at the present time is the immense opportunity for expansion and development which awaits the home producer. Imports of both poultry and eggs are appreciably below their pre-war dimensions, and it should be his concern to see to it that they do not recover. To that end, though increased production and increased attention to breeding are essential, it is perhaps even more important that he should make an earnest effort to ensure that his produce reaches the market as efficiently and attractively packed, and as fresh as, if not fresher than, the imported article. There

can be little doubt that producers in those Continental countries which, owing to internal conditions, have temporarily ceased to export poultry produce to these shores will sooner or later seek to re-enter the British market. They can only be resisted by the home producer enlarging and consolidating his position."

THE Agricultural Credits Act, which received the Royal Assent on 31st July, provides the following credit facilities for agriculturists:—

The Agricultural Credits Act, 1923.

Section I empowers the Public Works Loan Commissioners to lend money to "approved associations" for the purpose of making advances on mortgages, also to lend money direct to borrowers, subject, in both cases, to certain conditions. The amount secured by the mortgage must be repayable within a period of 60 years, and must not exceed 75 per cent. of the value of the land, as ascertained to the satisfaction of the Public Works Loan Commissioners at the date when the advance by the Commissioners is made. In the case where the repayment extends over the full period of 60 years, the rate of interest and sinking fund will be approximately $5\frac{1}{2}$ per cent. It should, however, be borne in mind that these facilities are limited to those farmers who agreed to purchase their holdings not earlier than the 5th day of April, 1917, nor later than the 27th day of June, 1921, and that the land comprised in the mortgage must be wholly or mainly agricultural land.

Agriculturists eligible for, and desirous of taking advantage of the facilities offered by this Section, can do so by making formal application to the Farmers' Land Purchase Company, 1, Great George Street, Westminster, S.W.1, or to the Secretary, Public Works Loan Board, Old Jewry, E.C.2.

Under Section 2 of the Act, new facilities are placed in the hands of farmers, smallholders, allotment holders, and other agriculturists, for obtaining short-term loans, to meet such expenses as the purchase of seeds, fertilisers, feeding stuffs, breeding and other live stock, machinery and implements, and the erection of silos, Dutch barns, fencing, etc.

For this purpose the Minister of Agriculture and Fisheries is empowered to promote the formation of Agricultural Credit Societies, having for their object, or one of their objects, the carrying on of the business of combining the credit of their members, so as to enable them, with the assistance of advances

from the Minister, to make loans to their members, repayable within a period not exceeding 5 years, for such agricultural purposes as may be approved by the Minister.

The share capital of such societies will consist of an unlimited number of £1 shares, on which 5s. per share must be paid up on allotment. There is no limit to the number of shares that any member may hold, but every member must hold at least one share. Once a society has been formed and has been registered under the Industrial and Friendly Societies Acts, a member may make application to his society for a loan up to £5 for each £1 share held by him, provided that this sum shall not exceed one-tenth of the total share capital of the society for the time being issued. Thus it will be possible for a member who has taken 20 shares in a society, upon which he has paid up a total sum of £5, to obtain a loan of £100, for a period not exceeding 5 years.

The distinctive features of an Agricultural Credit Society such as is contemplated by the Act, are :—

- (1) It rests on the fundamental principle of the mutual responsibility of its members;
- (2) It is local—its members living within a comparatively small area, and being well known to each other;
- (3) The liability of each member is limited to the full value of the shares in the society held by him;
- (4) It has a right, subject to certain conditions, to borrow money from the State for the purpose of making loans to its members.

Although such societies are intended solely for the assistance of persons engaged in agriculture, membership is open to any person sufficiently interested in promoting the prosperity of local agriculture, to be willing to lend his capital and his credit for the purpose.

Those interested in the matter, or desirous of forming an Agricultural Credit Society, should communicate with the Secretary, Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W.1.

Section III of the Act extends the facilities offered by the Improvement of Land Acts. The owners of agricultural estates, who wish to undertake permanent improvements such as the erection or extension of farm buildings and cottages, the making of roads, sewers, drains, etc., or the erection of silos, can obtain full particulars from the Lands Improvement Company, 1, Great George Street, Westminster, S.W.1, which operates under the Improvement of Land Acts.

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THE Ministry has published a brief summary of the courses provided at the Farm Institutes which have been established in England and Wales. There are now **Farm Institutes.** thirteen institutions of this type, of which eight have been started since the War. Last session the attendance was quite satisfactory, about 80 per cent. of the total accommodation being filled. The majority of the institutions provide winter courses in agriculture lasting for about 20 or 22 weeks, and in the summer, when the male students are required at home on the farm, dairying courses are provided for women. In a few cases, however, a year's course in agriculture, including the summer, is held. Horticulture and poultry-keeping figure in the curriculum. In all cases except one, farms typical of the district are attached to the Institutes, and serve to make the instruction of an essentially practical type.

The main purpose of the Farm Institute course is to enable a boy to leave his farm for the slack winter season of about six months, and during that time to become instructed in the broad scientific principles underlying the operations to which he is accustomed, or will have to be accustomed as time goes on. His interest is awakened, he is taught the why and the wherefore of many established customs which perhaps he had hitherto taken for granted, and generally he becomes imbued with a sense of the importance of "science with practice"—a condition which, in these days of progressive scientific farming, will be of enormous value to him in later years. It is well not to claim too much for the Farm Institute course. The object is not to provide training in science, or, on the other hand, practical experience in farming. The time available and the season at which the course is held preclude both these aims. It does not purport to give a complete training in agriculture, nor is it to be regarded as a stepping stone to the Agricultural College. It is primarily a "refresher," to take the farmer's boy out of the rut of established custom, and give him an interest in the unknown which will help him to take advantage in the future of all the immense stock of new knowledge which our scientists are day by day accumulating.

The Farm Institutes now in existence are situated in the counties of Cheshire, Cumberland and Westmorland, Essex, Hants, Herts, Lancashire, Northants, Somerset, Stafford, Suffolk, Carmarthen, Denbigh and Monmouth. A full list of

the courses which are being held at these Institutes will be published in a subsequent issue of the *Journal*.

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A PRELIMINARY statement of the Acreage under Crops and Grass, and Number of Live Stock in England and Wales in 1923, compiled from the annual agricultural returns collected on 4th June, was issued by the Ministry on 4th August, and appears on pp. 567-570 of this issue of the *Journal*. The statement shows that, compared with last year, the arable area has fallen by 129,000 acres, while that of permanent grass has increased by 44,000 acres, and there is also an increase of 78,000 acres in the area of rough grazings. The reduction in the arable area is mainly accounted for by the corn, pulse, and potato crops, the decline under these three heads being 451,000 acres, 82,000 acres, and 94,000 acres, respectively. On the other hand there has been an increase of nearly 300,000 acres in the area of clover and rotation grasses, and a small increase in the area of roots.

The number of horses on agricultural holdings has fallen by 59,000, but other classes of live stock have all increased. The number of cows and heifers is the largest on record, and the numbers of ewes and sows kept for breeding also show substantial increases.

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An account of the work accomplished in connection with drainage works for the relief of unemployment in 1922-3 is given on p. 519 of this issue. In this connection it may be stated that the Government have now decided that, subject to the consent of Parliament, moneys shall be made available to enable drainage works

for the relief of unemployment to be continued in the coming autumn and winter. The grants will be available only for combined schemes for the improvement of groups of holdings or properties, and not for field drainage work.

Drainage authorities, who have normal staff available, may proceed with the preparation of schemes, but no new staff for the purpose may be engaged, and no expenditure of any kind incurred, until the necessary sanction is afforded by the Ministry. No works may be started before 15th October, 1923.

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THE general index number of the prices of agricultural produce shows an increase from 51 per cent. above 1911-13 in June

The Agricultural Index Number.

to 53 per cent. above in July, this increase being mainly due to old potatoes being displaced by the new season's crop at a considerably higher price. The rise in the index number from this cause would have been greater but for decreases in the prices of fat stock.

The following table shows the percentage increase in each month since January, 1920 :—

PERCENTAGE INCREASE COMPARED WITH THE AVERAGE OF THE CORRESPONDING MONTH IN 1911-13.

MONTH.	1920.	1921.	1922.	1923.
January	200	183	75	68
February	195	167	79	63
March	189	150	77	59
April	202	149	70	51
May	180	119	71	54
June	175	112	68	51
July	186	112	72	53
August	193	131	67	—
September	202	116	57	—
October	194	86	59	—
November	193	79	62	—
December	184	76	59	—

Wheat and oats were dearer by 4d. and 3d. per cwt. respectively than in June, but as these commodities usually advance in price at this season oats remain unchanged at 41 per cent. above pre-war while wheat has advanced one point. Barley was 3d. per cwt. cheaper in July, but owing to the average price in July of the years 1911-13 being higher than in June a fall of 5 points is recorded. The price of first early potatoes in July was nearly three times that of old main crop potatoes in June, and the index figure rose from 31 per cent. below the pre-war price to 66 per cent. above, as compared with 75 per cent. above in July, 1922. Hay was slightly cheaper in July, and with a decline of 4 points on the month was 38 per cent. above the average of July, 1911-13, or practically the same as in July of last year.

Fat cattle recorded a decline of 8d. per 14 lb. stone, this being relatively a much greater reduction than in the years 1911-13, and the increase of 45 per cent. above pre-war prices is 7 points lower than in the previous month. Fat pigs were in little demand during July owing to the exceptionally hot weather and prices declined sharply, the percentage increase over the pre-war years falling from 69 in June to 54 in July, a

drop of nearly 25 per cent. since January last. Average prices of fat sheep declined further and were lower than at any time since January, 1922; the index number fell 11 points to 72 per cent. above 1911-13.

Dairy cows advanced slightly in price, but as the increase was relatively less than in 1911-13 the percentage increase has declined 1 point. All descriptions of store stock were cheaper than in June, store pigs showing the greatest reduction, the decline amounting to 17 points on the month, while store sheep and store cattle declined by 5 and 3 points respectively. Store sheep and store swine were, however, still more than twice as dear as before the war.

The average contract price of milk is unchanged in London as very little surplus milk has been forwarded, but prices in Birmingham and Manchester have advanced slightly, and the average over all has increased from 53 per cent. in June to 57 per cent. above 1911-13, or slightly more than in July, 1922. Butter advanced 1½d. per lb., a relatively greater increase than in pre-war years, and at 37 per cent. for July was 4 points higher than in the preceding month. Eggs were also dearer, but as the increase in value was relatively less than before the war the index figure shows a reduction of 4 points on the month declining to 36 per cent. above the years 1911-13.

The following table shows the average increases during recent months in the prices of the principal commodities:—

PERCENTAGE INCREASE AS COMPARED WITH THE AVERAGE PRICES RULING IN THE CORRESPONDING MONTHS OF 1911-13.

Commodity.	July 1922.	1923.				
		Mar.	Apr.	May	June	July
Wheat ...	53	27	31	37	38	39
Barley ...	49	8	11	16	17	12
Oats ...	55	36	39	42	41	41
Fat cattle ...	70	54	51	53	52	45
Fat sheep ...	107	94	100	103	83	72
Fat pigs ...	91	77	71	72	69	54
Dairy cows ...	64	58	55	50	50	49
Store cattle ...	39	31	29	33	31	28
Store sheep ...	108	92	92	98	114	109
Store pigs ...	115	136	131	126	130	113
Eggs...	80	55	37	43	40	36
Poultry ...	103	81	75	77	87	79
Milk ...	53	87	70	63	53	57
Butter ...	79	70	68	40	33	37
Cheese ...	50	95	92	42	44	54
Potatoes ...	75	-12*	-28*	-28*	-31*	66
Hay ...	37	42	40	41	42	38

* Decrease.

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AGRICULTURAL LANDOWNERS.

I.

THE RT. HON. LORD ERNLE, M.V.O.

The following pages are the substance of a Lecture on "Agricultural Landowners," given at the Summer Meeting of Vacation Students in the Examination Schools at Oxford on 9th August, 1923.

THE subject given me is that of Agricultural Landowners. It bristles with controversies which arouse many prejudices. But we can, for a few minutes, treat agricultural landowners as neither saints nor ogres, but as ordinary persons—neither better nor worse than ourselves.

Men are land animals. Their interest in land is therefore almost universal. Most people can conduct their business without attracting public attention. Not so the landowner. His business is always under observation, because it affects the business and life of everyone. At work, at play, at home, we cannot escape the landowner. The result is that for centuries questions affecting the ownership of land have been burning. To-day they are still ablaze.

It is a common impression that agricultural landowners have grown rich while others remain poor, or that they are only sleeping partners in the industry, mere rent-chargers on their estates—that, in fact, they are bloated parasites. Are they bloated? Are they parasites?

Stationary Character of Income from Farm Lands.—

During the last hundred years agricultural landowners have not grown richer. In net income they have become very much poorer. The growth of the gross national income of Great Britain is in striking contrast with the stationary character of the gross income of agricultural landowners. The following figures are only illustrations of these two facts. Without a complicated discussion they cannot be made strictly comparable. In 1800 the gross national income of Great Britain, both exempt and liable to income tax, was estimated at £190,000,000. In 1922 it was similarly estimated at £2,600,000,000. Now look at the gross income in Great Britain from agricultural land, farms and farm buildings, tithes, manors, fines on leases, and some sporting rights, in 1814 and in 1922. The former year is taken in preference to 1800, because the area of cultivated land had then become, under war pressure and fear of famine, more approximately as large as it is now. In 1814 the gross income

from agricultural land was $42\frac{1}{2}$ millions; in 1922 it was $43\frac{1}{2}$ millions, or practically the same. In 1814 it was rather more than one-fifth of the gross national income; in 1922 it was considerably less than one-fiftieth.

The stationary character of the gross income from agricultural land is the more remarkable, because, during this period, landowners have spent a vast amount of private capital on their estates. I am not considering the money spent in buying landed property, or even the money expended on the initial operations necessary to reclaim the land for cultivation. I am only speaking of the outlay of private capital in equipping the land with the farmhouses, farm buildings, cottages, fences (including gates and posts), drainage, water-supply, and farm roads, which are necessary to develop the productiveness of the soil. All this essential machinery of a farm is liable, like any other machinery, to wear and tear, and has to be kept in repair and renewed. The annual cost of this upkeep, including insurance and management, may be taken at a third of the gross rent.

Rents.—In a familiar often-quoted passage in his *Political Economy*, Mill points out that the rent of a farm includes two payments. One is payment for the use of the productive powers of the land; the other is payment of interest on the capital expended on that equipment which enables the farmer to use the land productively. The landlord, he says, is entitled to charge the ordinary interest on the value of the equipment; that is, he explains, on the cost of providing equipment as good as that then existing. It will be natural to expect that the payment of interest on capital, added to the payment for the use of the productive powers of the soil, would increase the gross income from agricultural land. It has not done so. The gross income has, as we have seen, remained stationary. What is the explanation?

It is the opinion of many experienced agriculturists that, after interest on capital at the low rate of $3\frac{1}{2}$ per cent. has been paid, and the annual cost of upkeep has been met, all rent for the use of the land itself has been swept away by the fall in prices. The correctness of this opinion mainly depends on the amount of private capital which agricultural landowners have expended per acre on the existing equipment of the farms of this country.

This subject was discussed in 1907 with great care and ability by Mr. R. J. Thompson in a paper read before the Royal Statistical Society. He came to the

conclusion that in 1900 the average expenditure of private capital on the existing equipment of farms was £12 an acre; that interest should be charged at $3\frac{1}{2}$ per cent., then the current rate at which the Government borrowed; that 85 per cent. should be deducted from the gross rent for repairs, insurance and management; and that, on those figures, out of every pound of rent 4s. 6d. represented payment for the use of land. More recently the Land Agents Society in 1919 prepared a Return from the actual figures of capital outlay. It relates to 9,000 acres, divided into 27 farms of different sizes, belonging to different owners, in different parts of the country. It shows that £146,000 was spent on equipping 9,000 acres, or an average of £16 an acre. The average net return to the landowner, after deducting from the gross rent the necessary outgoings for repairs, insurance and management, was $3\frac{1}{2}$ per cent. on his capital, and nothing at all for the use of the productive powers of the land.

Neither of these inquiries fully reveals the true condition of affairs. The outlay on a farm varies to some extent with the purpose to which the land is put. A purely grazing farm, for instance, requires least expenditure. Still more important is the variation in outlay per acre caused by the different sizes of farms. £1,000 laid out on a 30-acre farm is £33 an acre; £2,000 spent on a 100-acre farm is £20 an acre; £7,000 spent on a 1,000-acre farm is £7 an acre. Practically all the figures quoted by Mr. Thompson relate to farms over 300 acres. In the Return of 1919 ten of the 27 farms exceed the 300-acre limit. But in actual fact, on the pre-war figures, out of the 435,886 holdings of England and Wales, 421,314 are holdings of 300 acres or under, and 14,572 are farms above 300 acres. That is to say, 96 per cent. of the farms belong to the type in which equipment is most expensive; only 4 per cent. are of the type which it is cheapest to equip. The average expenditure per acre is unduly lowered by the disproportionate number of examples of large farms on which both Mr. Thompson and the Return rely. Based on the actual sizes of holdings, the average outlay cannot be put at less than £20 per acre. If this is so, landowners may receive interest at $3\frac{1}{2}$ per cent. on their capital outlay on equipment, and the cost of its upkeep, but nothing is paid for the use of the productive powers of the land.

Our system of agricultural landowner and tenant thus operates as a method of cheap agricultural credit, founded, not on State aid, but entirely on private capital. A lease is practically a loan of land equipped for cultivation at a low average rate of

interest on the capital expended in equipment. The farmer, who as tenant accepts the loan, is thus set free to use his own capital for the cultivation of the soil. The provision of the capital, running into several hundred million pounds, on which this system of cheap agricultural credit is founded, is one of the benefits which agricultural landowners confer on agriculture.

Landowners' Example a Lead to Advance.—Nor is it only their capital that agricultural landowners have contributed to the progress of the industry. They have by their example given a lead to advance. Medieval barons were indeed rarely interested in farming. War, military exercises and the chase were their chief occupations. There were exceptions. Edward II was a breeder of horses and an expert thatcher. An Earl of Berkeley, at or about the same time, is said to have attended all the markets of his neighbourhood with samples of his own corn, and fumbled in the recesses of his armour for his leathern bags of wheat, barley, or oats. But the foot of the lay owner rarely fattened the soil. The best farmers were the Churchmen, especially the monks. Two of the earliest treatises on farming were written in Norman French in the thirteenth century, one by a Bishop of Lincoln, another by a Dominican Friar. But the first English book was written by a Derbyshire landowner. In 1523 John Fitzherbert put his 40 years' experience into a *Book of Husbandry* which remained for more than a century the best and most practical work on English farming.

From the thirteenth century to the middle of the eighteenth there was little general improvement in agriculture. If a steward of a manor in the reign of Henry III had visited a village farm in the days of George II, he would have found the same methods, the same implements, the same limited range of crops, the same quality of live stock. Probably he would have thought the farming more slovenly, and lamented the abandonment of more than one useful practice. Yet a number of new sources of agricultural wealth had been accumulated and tested by landowners. They had, in fact, collected the material and means for a proper rotation of varied cropping; they had also solved the problem of providing winter keep for live stock, and of supplying the country with fresh meat at Christmas instead of the smoked and salted beef or mutton which were formerly the staple diet of the nation.

In both the great periods of agricultural progress—1760-1820, and 1853-74—landowners gave the lead. In the first, they were pioneers of improved practices; in the second, they were the

readiest to adopt the discoveries of science. It was the union of practice with science, which in the "seventies" made English farming the model for foreign nations, and founded the world-wide reputation of English live stock.

In the disastrous period of the last 20 years of the nineteenth century, landowners also proved their value. They bore their full share of adversity. They saved thousands of farmers from bankruptcy, nursed them through bad times, and crippled themselves in the process. Few have now the means to help in the same way or to the same extent. Heavy taxation, pressing hardly on stationary gross incomes, has completed the impoverishment which the fall in prices began.

To have created an efficient system of agricultural credit, to have been leaders in progress and mainstays in adversity are achievements which can be fairly credited to agricultural landowners. No doubt their self-interest was a spur. But it is unreasonable to deny them a mixture of more generous motives. During the last century, the net income from agricultural land has dwindled, as compared with the increased financial resources of other classes in the country, enormously. This fact has a bearing on some of the charges often made against agricultural landowners in the administration of their estates.

The Charge of Hostility to Small Holdings.—One charge is that landowners are hostile to small holdings. Technically, holdings of from one acre to fifty acres are included in this class. Before the War, out of the 435,886 farmers in England and Wales 292,000 were small holders. More than 66 per cent. of the farms in England and Wales are of this size; less than 34 per cent. are above. This very considerable proportion of small holdings does not confirm the charge of general hostility. That agricultural landowners are cautious in creating them is true. They know that certain conditions both in the holding and the holder are essential to success. If all these conditions are present, a man who has an average share of good weather and stable prices ought to succeed. If any of the conditions are absent, or if the man has a run of bad seasons and irregular prices, he is almost certain to fail.

In the small holder's interest landowners are cautious. They are cautious also in their own. It is a matter of business. Unless they charge a very high rent, they lose money. The land must be good in quality and convenient of access to roads and markets. Often it is the very piece which lets a considerable area of moderate and indifferent land. Suppose that

a landowner desires to create a small holding of 30 acres consisting of some of the best land on a farm of 200 acres, let at £1 an acre all round. The tenant naturally asks a reduction of rent on the area which is left to him. The eye, as he says, has been picked out of his farm. The landowner is lucky if he escapes with a loss of £40 in rent. Can he recover it out of the small holding? In most cases he cannot. At present prices, the equipment of a small holding of 30 acres will cost £1,000, or £33 an acre. Assume that the rent is 30s. an acre, that is £45. From the gross rent must be deducted one-third for the upkeep. The net rent is therefore £30, or only 3 per cent. on the capital outlay and nothing for the land. The result is that the tenant-farmer is disgruntled and unsettled; that the shareholder is aggrieved because he pays 10s. an acre more than the farmer over the hedge; and that, finally, the landowner is £10 a year out of pocket.

The Charge of Wasting Land.—Another charge is that of wasting land, firstly, by neglect to improve, and secondly, by excessive preservation of game. The total area of land in England and Wales to high-water mark, but excluding the acreage covered by lakes, rivers and canals, is 37,130,626 acres. The cultivated area under crops and grass, excluding gardens, is 26,025,000 acres. The area of commons, mountain, heath, moor, and other rough land used for grazing, amounts to 4,781,000 acres. Forests, woods and plantations occupy 1,881,000 acres. The remaining 4,445,000 acres are accounted for by buildings, gardens, railways, roads, and mountains and wastes not available for grazing. It is in the 4½ million acres of rough grazing that land is to be found which might be added to cultivation. Probably between 100,000 and 250,000 acres could be thus reclaimed. If expense were no consideration the area might be half a million acres.

In bringing land into cultivation there are two processes, each requiring some outlay of capital. The first is its preparation. Roots, for instance, have to be grubbed and stones removed; the land must be broken up, ploughed and probably marled: a portion must be sown for meadow or pasture. Almost all the cultivated land of the country has undergone this initial process. But the preparation took place too long ago to be taken into account in estimating the present capital outlay. Now, however, when the question is the expense of bringing new land into cultivation, it must be taken into account. It cannot be put at less than £5 an acre. To this must be added

the cost of equipment—that is to say, the farmhouse and out-buildings, the cottages, the fencing, including the gates and posts, the drainage, the water-supply, the farm-roads. What this will cost per acre largely depends on the size of the farms into which the newly reclaimed land is divided. Suppose that a landowner decides to reclaim a thousand acres of rough grazing, let at 1s. an acre, or £50 a year, and to do it as cheaply as possible. The initial cost of preparation is £5 an acre, or £5,000. At pre-war prices the cost of equipment for a thousand-acre farm cannot be put at less than £7,000, or £7 an acre. The capital outlay is therefore £12,000. Probably there will be no rent at all for several years. But assume that 12s. 6d. an acre is obtained from the first, or a gross rent of £625. From the gross rent must be deducted one-third for upkeep, insurance and management, say, £205. The net rent is therefore £420. But the landowner has lost the £50 a year rent for his rough grazing. He therefore only receives £370 a year on the transaction. If, as is almost certain, he has had to borrow the capital of £12,000, he pays for the loan at 5 per cent. interest £600 a year, and he receives from his new investment a net return of £370 a year. He loses £230 a year.

Go one step further, and suppose that the landowner is an enthusiast for small holdings, does what, on social grounds, we should all desire him to do, and lays out his thousand acres in 33 small holdings of 30 acres each. The initial cost of preparation is the same—£5,000; the equipment of the 33 holdings at £1,000 apiece is £33,000—making a total capital outlay of £38,000. At the best it is moderate land. Assume that the landowner lets at 25s. an acre, and gets it from the first. His gross rent is £1,250. From this has to be deducted the one-third for upkeep, say, £412. With 33 sets of farm buildings the cost of upkeep might probably be more. But that point may be waived. His net rent is therefore £838, or, if we deduct the £50 rent for rough grazing which he has lost, £788. But he has borrowed £38,000 at 5 per cent. He pays for his loan £1,900 a year, and receives from his new investment a net £788 a year. In other words he loses £1,112 a year. Comparatively poor men must set some limits to their philanthropy.

It is also said that agricultural landowners waste land and diminish food production by excessive preservation of winged game. That damage may be done to crops by winged game is not denied, and, where preservation is carried to excess, it

is a real evil. But even in pre-War days, the damage done was perhaps neither so great nor so general, as has been represented.

Bad farming often sheltered itself behind the alleged depredations of the pheasant. Nor does it seem, at first sight, probable that land which was worth cultivating was ever withdrawn from food production. Landowners are rarely rich enough to sacrifice a farming rent, however small, for a sporting rent of from 1s. to 3s. per acre.

Less bitterness against game preservation would be aroused, if landowners exercised their sporting rights themselves and did not let them to shooting tenants or syndicates. It is not merely that agricultural landowners themselves rarely preserve to excess, either from want of money, or respect for public opinion, or regard for their tenants. It is the intrusion of the commercial element into sport—the letting to strangers and the sale of the game—which chiefly outrages public opinion. Yet even this commercial element has advantages to the country side. Many landowners can only afford to live in their country houses by the help of sporting rents. In other cases the sporting rights secure tenants for country houses that would otherwise stand empty. Those who live in the country know the loss to the whole neighbourhood when the big house is unoccupied. There is loss of employment and wages, loss of practice to professional men, loss of custom to local tradesmen, loss to the ratepayers of the rateable value of the empty house which must be made good elsewhere. There is loss also to farmers, for the rent of the house and the sporting rights often enable the landowner to maintain the efficient equipment of the farms which otherwise would deteriorate. Even if the house remains unoccupied, and only the sporting rights are let to shooting tenants, there are still advantages. Some of the money may go to the upkeep of the estate; keepers are employed who otherwise might be out of work; beaters earn money at a time when cash is scarce in rural districts. And sporting rights, thus severed and let, are a valuable rateable asset which diminishes the general burden of ratepayers. They pay the full and not the special agricultural rate; added to the rateable value of woodlands in their natural unimproved state, the rents substantially increase the assessment, and help to reduce the burden of the rates to everyone else.

(To be concluded.)

* * * * *

POINTS OF THE HORSE.

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It is not the intention to discuss, in this article, the points of the various breeds of horses, but rather to try to define the good and bad points which may be seen in all classes of horses. In the space available we cannot hope to deal fully with a subject on which volumes have been written, but must confine our remarks to what seem to be the more important points. It is proposed to recognise only two types, the light (speed) horse, and the heavy (slow) draught horse, pointing out the few instances in which these two classes ought to differ.

To a great extent the economic value of a horse will depend on his durability, on his capacity to undergo severe strains in the work he has to do, whether in his speed-work, or in the moving of heavy loads, without breaking down and becoming useless for further work.

This durability will depend on his breeding or quality, on his conformation, and on his action. To judge these points correctly needs close observation and constant practice, and also some knowledge of the structure of the animal's body is useful. Many good judges seem to know intuitively what is the best shape, and do so without any knowledge of anatomy, but the man who has this knowledge will become proficient in a much shorter time.

The Framework.—The horse's framework or skeleton is composed of a large number of bones connected by cartilage and ligaments. Attached to the bones are the muscles which supply the motive power under the control of the nervous system. The bones form three classes of levers, to which the muscles supply the power and the joints form the fulcra. Many muscles act on distant parts of the framework, to which they are attached by long tendons or sinews. This arrangement gives lightness and elegance to the lower part of the extremities.

To a considerable extent the bones of the skeleton give shape to the body, but not entirely so: for example, in the neck the shape depends on the muscular development. If we compare a living animal with an illustration of the skeleton (A) this fact is at once seen to be true. Again, the hind-quarters have a bony framework, but their shape largely depends upon the great muscles covering the bones of this region.

A glance at a well-developed horse will show a marked difference in the muscular development of the hind extremities compared with the fore extremities.

The hind limbs supply the propelling power, which enables a draught horse to move a heavy load, a hunter to fling himself (and his rider) over a high or a wide obstacle, and a race-horse to travel at high speed. To do this, the muscular development of the hind parts must be great, while the fore extremities, having only to support the weight of the body (of which they seem to carry more than a fair share), take but a small part in propulsion. For this work the fore limbs need far less muscular power. If we assume that the hind legs support the weight of the posterior half of the trunk, it will be seen that, in addition to carrying the anterior part, the fore limbs have to support the long neck, to the end of which is attached a heavy head. These facts are borne out by the greater muscular development of the hind extremities, and also by the very different modes of attachment to the trunk of the fore and hind extremities.

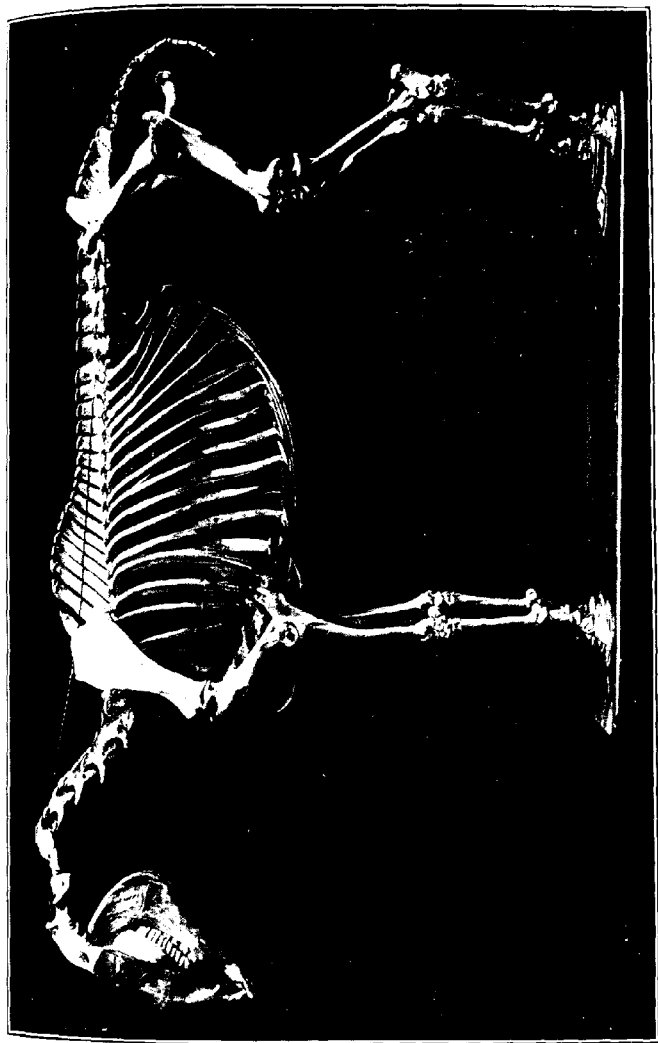
In the latter, the top bones of the limbs, the ossa innominata or pelvic bones, are firmly attached by a fixed joint, to the back bone in the sacral region. An examination of the skeleton will show how carefully nature has provided for firmness and strength in this region to withstand the enormous strain when pulling a load, or leaping or galloping.

When we examine the fore-extremity we notice the absence of the great powerful muscles supplied to the hind extremity, and we find that the fore-limb is only attached to the front part of the trunk by muscles, and that there is no fixed immovable joint like that in the hind leg. If we stand in front of the horse and direct our attention to the anterior part of the trunk, we see that it is placed between the shoulders, to which it is attached by muscles, which suspend it (the trunk) as a man's body is supported in a hammock.

These anatomical facts confirm the view that the hind limbs are used for propulsion, while the fore-limbs chiefly support the weight of the body.

The fact that the fore-legs have to support so much weight will explain the reason why they wear out more quickly than the hind parts do.

In carrying a man in the saddle it has been estimated that the horse's fore-legs take 66 per cent. and the hind-legs only 34 per cent. of the man's whole weight. In going downhill



A.—Skeleton of Horse.

still greater portion of the weight will be thrown on the fore-legs.

The movements of the limbs in walking, trotting, galloping, etc., are exceedingly complex, and are brought about by different groups of muscles, contracting and relaxing in proper sequence, and all working together harmoniously. This co-ordination of the various groups of muscles, taking part in any movement, is fortunately not controlled by the animal's will, but is regulated by a special part of the brain (cerebellum) set apart for this work.

Before dealing with quality, shape and action, it is necessary to mention the lubricating system of the body, by which the movements of the limbs are made smooth and easy. Each joint is surrounded by a capsular ligament forming a bag enclosing the ends of the bones. This bag is lined by a synovial membrane which secretes the lubricating fluid, synovia or joint oil. Wherever a tendon plays over a bone, or through a fibrous sheath, synovial membranes are arranged to provide the lubricating fluid and so to prevent friction. Without this lubricating system, the rapid movements of the limbs would soon become impossible, and the wearing parts would be quickly destroyed by friction.

Quality or Breeding.—Horses show their breeding in their bones, skin and hair. The bones of a well-bred horse are denser, harder, more ivory-like, than those of an under-bred animal, in which they are found to be softer, more spongy, and far less durable.

The skin should be thin and elastic and covered with fine short hair, and in those heavy breeds in which long hair or "feather" grows on the lower part of the legs, it should be fine, straight and silky, not coarse or inclined to curl. A coarse thick skin and coarse thick hair in a draught horse will indicate want of breeding and point to bone of a poor quality.

Horses, however, also show quality in the size and shape of the head. It has been written (The Druid): "Had I to choose a hunter by seeing one point only, it should be his head, for I never knew one with a small clean intelligent face and prominent eyes to be bad" (B. See illustration.)

Horses of all classes show their quality by their heads, which should be small, wide across the forehead, with large kindly eyes (a sign also of good temper), small pointed ears, a wide space between the outer corner of the eye and the angle of the lower jaw, large open nostrils, and plenty of space between the

branches of the bottom jaw to give room for the upper part of the windpipe (larynx). The nostrils must be thin and flexible and capable of great distension. The horse is unable to breathe through his mouth owing to the great length of the hanging soft palate, and he therefore needs to have nostrils capable of distension to admit sufficient air during exertion.

In the low-bred horse the head is large and coarse and unshapely, with large ears, a narrow forehead and small eyes and nostrils.

Quality and good breeding denote endurance. Dick Christian has said, in speaking of the thoroughbred hunter: "I never heard of a great thing yet, but it was done by a thoroughbred horse."

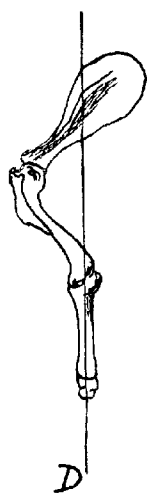
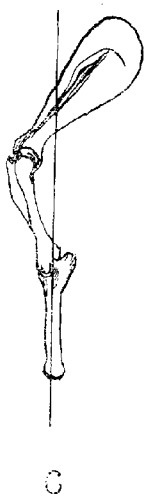
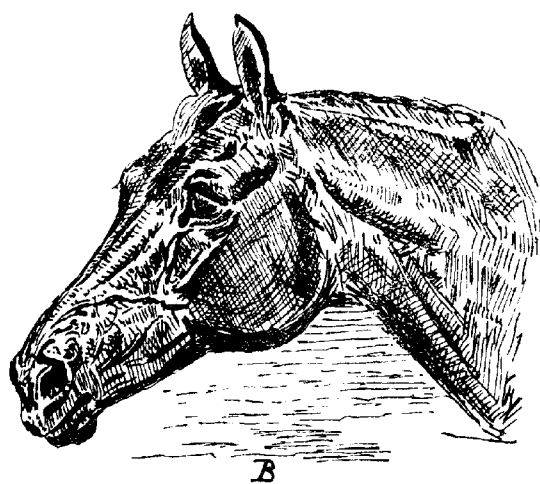
Breeding tells, and it is wise for the horseman to look for these indications of quality in whatever class of horse he requires.

Conformation.—As indicated above the horse's locomotor apparatus contains a highly organised collection of bones and joints, muscles and tendons, and an intricate set of levers, all working harmoniously together, without waste of power and without undue friction.

This harmony will depend greatly on the true shape of the body and limbs, and it must now be our task to show what is to be regarded as the correct conformation. It is necessary first to take a general survey of the animal as a whole before making any detailed examination of the several parts, head, neck, trunk and limbs.

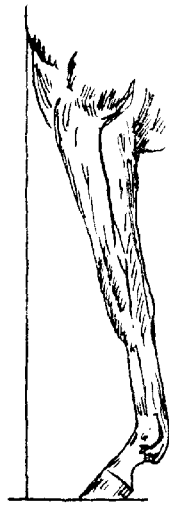
When viewed from a short distance the well-proportioned horse should deceive the eye; he should seem much smaller than he afterwards proves to be on closer acquaintance. The most remarkable instance of this, in our experience, occurred when inspecting a high-priced weight-carrying hunter. When the door of the loose-box was opened our first impression was that we were looking at a "mere cob," but on standing at his shoulder the "mere cob" proved to be over seventeen hands high! This deceptive appearance is an excellent point in a horse's favour.

The Head.—Still standing at a distance the shape of the head should be noted, and the way it is attached to the neck. The head should be carried gracefully and should move freely on the neck without fullness or heaviness at the junction of head and neck (B).





E



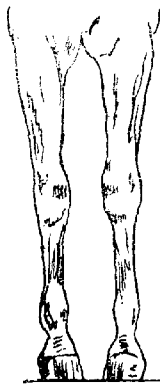
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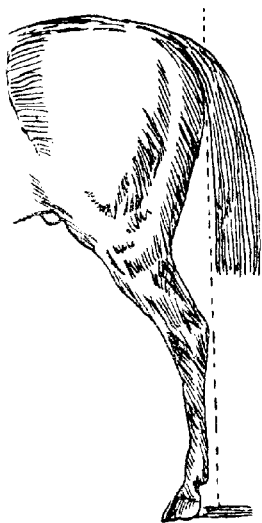
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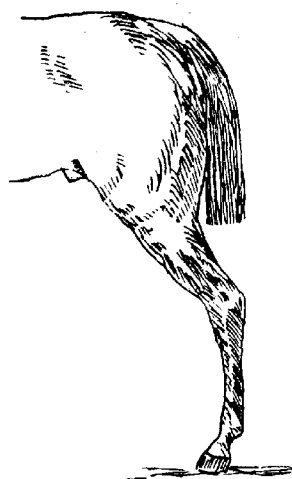
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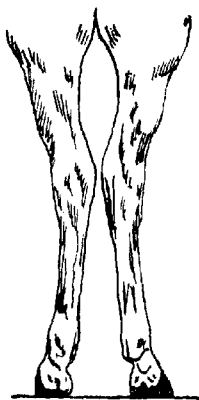
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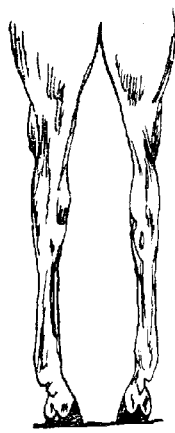
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S

The neck should be sufficiently long and muscular, with a well defined wind-pipe in front, and nicely arched at its upper border, and *without* a heavy crest. The crest is formed by a mass of fat surrounding the long elastic ligament of the neck, which helps to support the weight of the head. A thick heavy crest only adds to the weight to be carried by the fore-legs.

In the draught horse the neck should be muscular, of medium length and thickness, and unencumbered with fat.

In all classes the ewe-neck with the badly set-on head is to be avoided.

The chest, seen from the front, should be narrow in the light speed horse, but broad and muscular for the heavy draught horse. The space between the fore-legs in the former, should allow the open hand to lie easily under the breast bone, but in the latter the breast needs to be wide and well muscled, and the fore-legs sufficiently separated. Again, viewed from the side the chest should be deep from above downwards rather than broad from side to side. The deep oval chest gives a better girth and a greater lung capacity than the broad round chest. Also the deep chest gives freer play for the shoulders, and is evidence of good staying power. A broad chest, with too much space between the fore-legs, renders free smooth action impossible.

In the speed horse the neck seems to blend imperceptibly with the shoulder, but in the draught horse there is a sufficiently deep hollow at the junction of neck and shoulder into which the collar may fit comfortably.

The ribs behind the shoulders should be sufficiently arched to form an oval chest, and the posterior ribs should be sufficiently long to prevent an appearance of "lightness in the flank." The last rib should be about a hand's breadth in front of the hip bone to give a "well-ribbed up" appearance. This shortness of the space between the last rib and the hip bone may be due, either to the presence of an extra or "floating" rib, or to the loin region containing only five vertebræ.

Where a horse is "badly-ribbed up" there is no floating rib, and the number of lumbar vertebræ is often increased to six instead of five.

The "well-ribbed up" horse is generally a good doer, while the "badly-ribbed up" animal is often a delicate feeder, difficult to keep in good condition and very liable to scour.

The Withers.—Turning our attention next to the upper line of the body, the withers should be prominent and should rise up well above the shoulder blades. The withers should be thin in the speed horse, but much thicker and more muscular in the draught horse. Low withers are inadmissible except in the immature animal. The withers are formed by the long superior spinous processes or projections of the first few dorsal vertebræ, and the further back the long processes extend the shorter the back will appear. Between the withers and the croup the spinous processes are all of equal length.

The Back.—Although anatomically the withers are part of the dorsal region or back, the horseman recognises two regions, first the withers, then the back. The back should be straight. A hollow back must be regarded as a sign of weakness. In all old horses, there is a tendency for the back to become hollow. The muscles on either side of the back-bone should be well developed and fill up the angle between the ribs and the vertebræ.

The loins lie between the back and the croup and are formed by the lumbar vertebræ, five or six in number. When six bones are present the loins appear too long, unless well covered with muscle, and the space between the last rib and the hip bone too wide. The loins should be broad, muscular and short, and should continue the line of the back towards the croup. If the line rises from the back to the croup the horse will have a "roach-backed" appearance. It is important that the upper line of the body from the withers to the croup should give an impression of shortness when compared with the under line from the elbow to the stifle.

Although *the quarters* belong to the hind extremities, it is convenient here to continue the survey of the upper line backwards to the buttocks. The quarters should be well shaped and pleasing to the eye, the central line being slightly convex. The hip bones should be wide, but not sufficiently prominent to warrant the term "ragged." The tail should be set on "high" and be carried with distinction (K). We shall refer again to the quarters in describing the hind extremities.

The Under Line.—Turning our attention to the under line of the body, when the shoulders are good, the chest deep and the posterior ribs of sufficient length, the under line will appear long, and nearly parallel with the surface of the ground, and the horse is said to "stand over a lot of ground." The horse with upright shoulders, badly placed fore-legs, and a

round barrel, will look "leggy" and show a "lot of daylight under him."

In the majority of horses the length from the point of the shoulder to the buttock is about equal to the height at the withers, so that the body and limbs (excluding the neck and head) form a square. This rule will hold good for the "long low" horse as well as for the "leggy" looking animal with a "lot of daylight under him."

The reason for this different appearance is that the former has good oblique shoulders, a short back and a long under line; in the latter the shoulders are upright, making the back look longer, while the under line is defective owing to the backward position of the fore-legs, the shortness of the posterior ribs and the long space between the last rib and the hip bone. It is the true conformation of the body which is deceptive making the top line appear short and giving the under line length, but when the shape is wrong the opposite effect is produced, a long back and a short under line producing a high "leggy" appearance. If two horses were measured for length and height, although one looked "long and low" and the other "leggy and light in the barrel," they would both be found to approximate the squareness of the body and limbs mentioned above.

The Fore Limbs.—Next, viewing the fore-leg from the side, we should find a long oblique shoulder-blade, sloping upwards and backwards from the shoulder-joint. This appearance of a good sloping shoulder is aided by the correct position of the second bone, the humerus, which should form a wide angle with the scapula, and should be placed in a more or less perpendicular position between the shoulder-joint and the elbow (C). This brings the fore-arms and knees well forward and adds to the length of the under line of the body.

If, however, the humerus is more horizontally placed (D) the fore-arm and knee will be more backward under the body, and will give a shorter under line. This latter position of the humerus goes with upright shoulders, while the more perpendicular humerus is seen with the good sloping shoulder. Well-shaped shoulders are essential in all classes of horses, giving smooth free action to the fore-limbs, but in the draught horse some authorities maintain that a more upright shoulder is not only admissible, but even an advantage in giving greater power in collar work. This may be true, but to-day a well-

made draught horse is expected to be capable not only of walking well, but of trotting with good free action, and for this the sloping shoulder is essential. The shoulder-blade should be well covered with muscle in the speed horse, and still more so in the heavy horse.

To test the obliquity of the shoulder, an imaginary line may be drawn upwards from the centre of the fore-arm and should pass just behind the shoulder-joint, so that the major portion of the scapula is behind such a perpendicular line (C). The large and powerful muscle which fills the angle formed by the scapula and humerus should be well developed, plump and firm.

The fore-arm, between the elbow and the knee, should be long, broad and muscular above, but narrowing towards the knee. A weak thin fore-arm is a great disadvantage in both speed and draught horses. The knee should be large, flat in front, but with a strong projection at the back formed by a bone, the trapezium. This bone gives attachment to important muscles of the fore-arm, and also forms a groove between it and the main part of the joint, through which pass two of the flexor tendons. If the trapezium is small and placed too close to the main joint, the tendons have not sufficient room for free play and are cramped in their action. Below the knee, the cannon bone should be short and strong, and the leg broad from front to back. This will give the necessary "good girth" below the knee, and the "flatness of bone" as it is termed in horseman's parlance. The width of the leg below the knee depends upon the position of the three back-sinews which pass down behind the cannon bone. These three sinews should be clearly defined and stand out well from the cannon bone, and from each other. It is *this* which gives "good girth" and "flatness" so much praised. When the back sinews are packed closely to one another and to the back of the cannon bone, the leg feels round instead of flat, the girth is small, and there is a "tied in" appearance below the knee. Although "flatness of bone" below the knee is often spoken of, the term is incorrect, as the cannon bone is oval from side to side and narrowest from front to back, and cannot give an appearance of "flat bone," which is due, as stated above, to the position of the back-sinews in relation to the cannon bone.

The fetlock should be sufficiently large and strong, with well-developed sessamoid bones at the back. These two small bones are attached behind the cannon bone at its lower end,

and together form a groove over which two flexor tendons play freely.

From the fetlock, the pastern slopes downwards and forwards to meet the hoof at the coronet. This slope of the pastern varies considerably in different horses, but should always correspond to the slope of the front of the hoof, to which it should be parallel.

The hoof should slope upwards and backwards to the coronet at an angle of about 55° , and the slope at the heels should be parallel to that at the toe, and the heels about half the height of the front of the hoof. One frequently reads the absurd statement that the proper slope of the front of the hoof is at an angle of 45° . A single glance at a drawing of a hoof at this angle will show its impossibility. On raising the foot and examining its under surface, it should be almost circular in shape, with wide open heels, a concave sole and a good strong frog. There is nothing more true than the old saying, "no foot, no horse." However good his other parts may be, a horse will be of little economic value if his feet are faulty.

Lastly, before viewing the fore-legs from the front we should drop an imaginary line from the point of the shoulder to the ground (E). If the leg is properly placed and well shaped, the line should touch the ground slightly in front of the toe. In a horse with the "knees back" the line will fall several inches in front of the toe (F). In viewing the fore-legs from the front the fore-arms should be long and muscular, the knees broad and strong, and the fetlocks large and well developed. Large joints, in proper proportion to a horse's build, will give a distribution of the weight over a larger surface, and will also give promise of well-developed muscles and stout tendons.

The fore-legs should be perfectly straight, so that an imaginary line, drawn from the centre of the fore-arm (front) to the ground, should divide the knee, cannon bone, fetlock, pastern and hoof into two equal parts (G). Very many horses do not come up to this standard, some being "calf-kneed" (H), others "pintoed" (I), while many have legs turned out from the fetlock (J). Horses having such defects cannot have true action and will not be durable.

Hind Limbs.—Next, turning our attention to the hind extremity as seen from the side, the quarters should be well shaped and lengthy from the croup to the buttocks (K). The shape of the quarters depends partly on the bones forming the

pelvic cavity and partly on the great muscles clothing the bones. The sacral vertebræ, which follow after the loin bones, form the roof of this cavity, and should continue in almost the same horizontal line as that of the back and loin, and the first tail bones, which come after the sacrum should continue the line backwards. In such long level quarters the tail will be "set on high up," but where the sacrum and early tail bones droop downwards the quarters will have the shape known as "goose-rumped," and the tail will be "set on low down" (L.). Many goose-rumped horses, however, make excellent hunters.

The muscular development of the quarters and thighs should be good and in keeping with the conformation of the fore-hand. Too much muscle behind with a light fore-hand is not good.

The thigh bone (femur) slopes downwards and forwards from the hip joint to the stifle, and should be well covered with powerful muscles. From the stifle to the hock the bone (tibia) slopes downwards and backwards. This part of the limb corresponds to the fore-arm and should be long and muscular. Length of the gaskin and fore-arm is essential, while the parts below the hock and knee need to be short.

The hock (tarsus or ankle) is perhaps the most important joint in the limbs. It should be strongly built, with a good length of the bone at the back forming the point of the hock (calcis). To the calcis are attached tendons belonging to the powerful muscles of the back of the tibia, and other tendons also play over this bone in passing down the leg to the foot. The main hock-joint, in which there is the greatest movement, is between the end of the tibia and a bone of the hock known as the astragalus. The articulatory ridges on this bone run downwards and forwards and outwards and play an important part in the action of both hock and stifle. Sir F. Smith, in writing of the hock, attributes the "well-marked stifle action, particularly well seen in trotters" to the screw-like action produced by the astragalus. In addition to the main joint there are three minor joints in which the movement is slight and gliding. When viewed sideways the hock should be broad both above and below, and the point of the hock (or calcis) should stand out prominently, and well clear of the lower end of the tibia. On looking at the hock from the front it should have a bold clearly-defined outline, and on the inner surface the small bones forming the gliding joints should be strongly developed, and we should be able to feel, between the bones.

the three grooves which mark the position of the minor joints. A weak hock is broad above but small and narrow at its lower part, from whatever point it is viewed.

An imaginary line dropped from the buttock should touch the point of the hock and the posterior margin of the leg, as far as the fetlock and then drop to the ground (M). If the hock is too much curved ("sickle-hock"), the line will touch the point of the hock but no other part of the leg (N). If the leg inclines backwards from the hock, the same line will strike the ground near to the toe (O). If the hock is too straight (P) it will be more likely to be injured by concussion, and in the straight hock the os calcis has a cramped appearance. Below the hock the limb follows the same conformation as the fore-leg below the knee, but the pastern and hoof are more upright, and the hoof is longer from toe to heel, is oval in shape, and has a more deeply-concave sole.

When seen from behind, the quarters should be equal both in regard to the position of the hips and in muscular development: any inequality denotes some defect. The muscles clothing the inside of the thigh should be plump and firm and round. Any deficiency of muscle here will give a "split up" appearance between the thighs.

The hind legs should be straight (Q) with the hocks neither too close together, nor too wide apart, and should not turn outwards from the hocks (cow-hocked) (R), nor turn inwards (pintoed) (S).

Action.—Good action generally depends on good conformation, and a badly-shaped horse cannot be a good mover.

To judge action the observer should see the horse move at the walk, trot and gallop (if the horse is to be used for work at this pace) both going away and coming towards him and also in passing. In passing it will be seen whether the horse has well-balanced equal action before and behind. The walk should be light and active, and the feet lifted high enough to clear any ordinary inequalities in the road surface. The fore-legs should be extended well forwards before the feet touch the ground and the hind-legs must be brought well under the body so that the hind-hoofs at least cover the impressions made by the fore-hoofs.

A good active walker will usually have good action in all his paces, while a shuffling, clumsy, heavy walker will not. In the walk, the fore and hind-legs should be carried directly forward in a straight line, without any faults such as

“dishing” in front, or “twisting” the hocks outwards and the toes inwards.

In the trot the hind-legs must be carried well forward under the body, and the fore-legs carried equally to the front, without too much knee action, but in any case the action before and behind should be equal and well balanced.

High knee action with indifferent hock action is often seen, but is very faulty.

From an economic point of view, excessively high action must be condemned, however beautiful it may look in the show ring or in the park. Such action causes too much concussion and rapid wear of the limbs. A moderate all-round action is preferable, as more durable. In the trot, as in the walk, the action should be straightforward, without any “dishing” in front or “twisting” behind. In the gallop the action should be free, smooth and low, and without any high jerky bounding movement such as may be seen in a horse that is not a galloper. •

In the true galloper the impression conveyed to the observer is that of a beautiful, well-oiled piece of machinery, working with faultless smoothness and precision, and at high speed.

True action means that the work is done without loss of power and with the minimum of effort, and consequently with the least amount of wear and tear.

Acknowledgments :—Badminton Library ; Smith's Veterinary Physiology ; Hayes, Points of the Horse ; The Veterinary Adviser, Leighton ; Horses and Stables, Fitz-Wygram ; Judging Livestock, Craig ; Journal of Royal Agricultural Society.

* * * * *

PIG-KEEPING.

I.

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The Farmer's Aim—Pork, Bacon; Scale of Business; Capital Required; General Management; Breeding of Pedigree Pigs; Duties of the Pigman; Breeds, and Suitability for the Particular Business adopted; Pure v. Cross-bred Pigs.

In 1922 the pig population of England and Wales was returned as 2,298,936; in 1872 the number was 2,586,000. In the intervening 50 years the demand for pig products in this country had steadily increased, but this demand was not accompanied by a corresponding increase in the numbers of our pigs, with the result that our imports of bacon rose from 2,001,855 cwt. in 1872 to 5,982,152 cwt. in 1922. Imports of hams, lard and pork showed similar advances. The imports figure for pork in 1922 was 757,606 cwt., while the total weight of pig products imported in 1922 was 10,422,320 cwt., representing a value of £55,306,027.

In 1881, Denmark's pig population was just over 500,000; at present the figure is in the neighbourhood of five times this number. While those engaged in British agriculture failed to keep pace with the growing demand for the products of the pig, Danish agriculturists and bacon curers set themselves the task of finding out exactly what the British consumer wanted in the way of bacon, and having learned this, they then proceeded to cater for the British market. The result is that to-day Danish bacon holds a strong position in the favour of the British housewife, and although it should not be impossible, it will not be a speedy or easy process to displace it. If British agriculture is going to succeed ultimately in holding the British market against the foreigner in this respect, it must supply what the bacon curer and the consumer want. If this is done there is no reason why the whole of British requirements in pig products should not be produced within the British Isles.

Certain reasons have been put forward from time to time to explain why farmers have not developed the pig side of farming. Possibly the most important of these reasons has been the periodical fluctuations in the price of pigs. It is,

however, those breeders and feeders who have pursued a steady policy, and who have not jumped in and out of pig-keeping as the prices went up and down that have suffered least from the changes in market values. It is possible that fluctuations may occur again, but the increased operations of the home bacon factories should help considerably to stabilise prices. In any case a consistent policy of pig-keeping should be the safest course.

The prevalence of Swine Fever and Swine Erysipelas, together with the pressure of Swine Fever regulations, have also restricted development.

Inquiries which have been made recently with regard to the present position of the pig trade, have tended to show that the bacon factories already established in the country are able to deal with the present supply of pigs, and that some of them experience difficulty in obtaining the required quantities. Complaints are made that the pigs supplied, even when adequate in numbers, may be unsuitable in conformation, weight and feeding. Further, there is an increasing demand for pork which tends to reduce the supply of pigs for bacon.

In addition to the broader economic argument for pig-keeping on an increased scale, one must bear in mind certain other considerations in favour of the pig. The sow's prolificacy in rearing 16 pigs in a year compares favourably with the ewe or cow. The pig is invaluable in utilising glut products, for example, potatoes and barley as in the winter of 1922-23, and whey on cheese-making farms; and further, the pig is the most economical manufacturer of meat, putting on 1 lb. of live weight increase with less food than any other farm animal.

The Farmer's Aim.—In starting or reconstructing his pig-keeping the farmer should consider his market, and whether he is to cater for the fresh pork or bacon trade, or both. It is usual for good pork pigs to make a higher price per pound than bacon pigs, and to sell pigs for pork has proved, lately, a more profitable line of business than to supply pigs for bacon. On the other hand the pork demand is more subject to seasonal and other fluctuations. Bacon prices are steadier. Pork production is more speculative, but offers greater chances of profit.

The demand of the present day is for small joints of good quality pork and for mild cured bacon produced by young pigs.

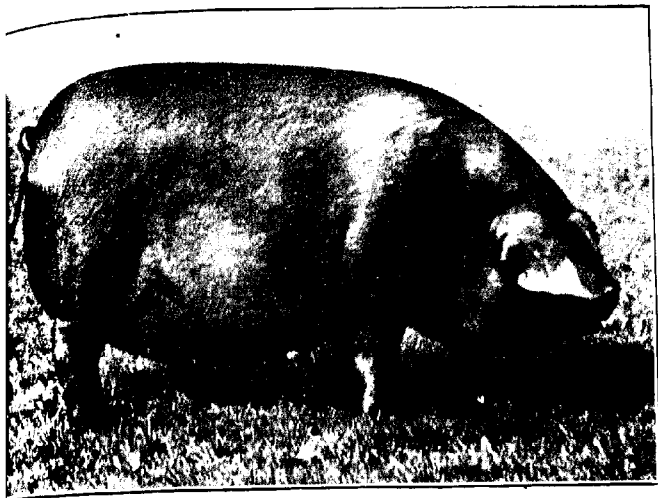


FIG. 1.—Large Black Gilt—Molly of Moulton 2nd—a dual purpose type of female pig which could be mated to breed bacon or pork pigs.

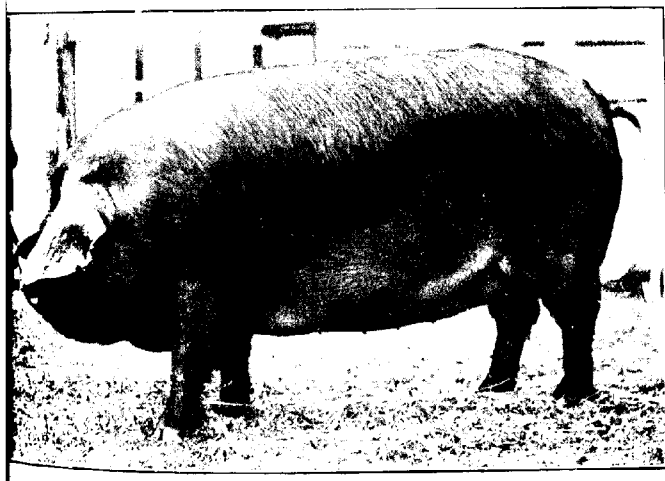


FIG. 2.—Large Black Sow—Cornwood Lass 67th—a typical bacon dam.

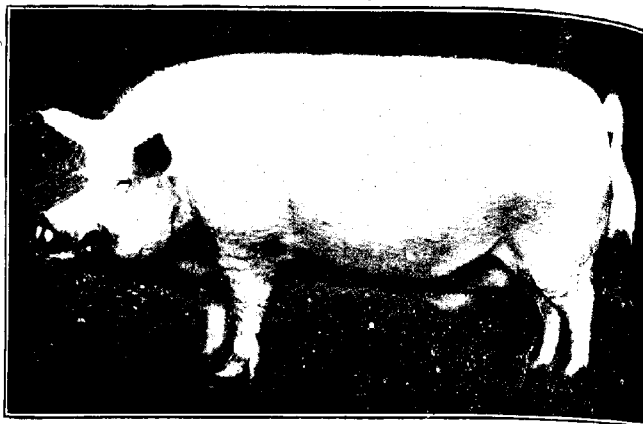


FIG. 3.—Large White Boar—Worsley Jay 35th—a typical bacon sire.



FIG. 4. Middle White Boar—Shrewsbury—a typical dual purpose sire, suitable for breeding pigs either for pork or bacon.

It is for this class of pork and bacon that the consumer will pay highest prices.

The size and degree of fatness, of joints of pork wanted, vary in different districts. The type of porker most popular on Smithfield market is one of about 90 to 100 lb. live weight and about 60 lb. dead weight at 4-5 months old, but the pork pig which is in most general demand throughout the country is one weighing 120-140 lb. live weight or about 100 lb. dead weight at about 5-6 months old. In certain manufacturing centres in the North Midlands and Black Country the "fat pork" pig is wanted: that is, a pig weighing 240-300 lb. live weight and about 180-220 lb. dead weight. The demand for "fat pork" is, however, strictly limited, and very frequently there is an over supply of fat heavy pigs. When such a surplus occurs these pigs make poor prices, actually about the same as fat sows, and they are then commonly used for sausage-making. Generally speaking the smaller the pig the higher the price paid per pound, and the heavier the pig the lower the price per pound.

Bacon curers appear to be agreed that the ideal type of pig for bacon should weigh from 200-220 lb. live weight and from 140-170 lb. dead weight, and should be fit to kill at 6-7 months old.

Thus we see that with the exception of the "fat pork" type, pigs should be ready for killing at 4 to 7 months old. Possibly the largest and keenest demand is for the pork pig of 5 score dead weight. The 3 score pork pig is required almost exclusively for the London market. The fat pork trade is the least attractive, since it is limited in demand, confined to particular areas and frequently over-supplied, more particularly because the older-fashioned feeders have not yet realised that the requirements of consumers have changed and that young, early-maturing, good quality pigs are what is now generally wanted.

It should be recognised that the cost of production of pork is higher in older than in young pigs. Professor Henry has given certain figures taken from a large number of experiments conducted in the United States, which show that to produce 100 lb. of live weight increase, pigs weighing 50-100 lb. live weight required 400 lb. of food; pigs weighing 150-200 lb. required 482 lb. of food, and those weighing 250-300 lb. needed 511 lb. These requirements are all slightly in excess of those obtained in this country recently with skilfully balanced

rations, but they serve to illustrate the point that the heavier the fattening pig, the more food is required to produce 1 lb. of increase.

It is hardly possible to supply first-class porkets (3 score) and bacon pigs from the same litters, but it is possible to supply medium pork pigs of 5 to 6 score and bacon pigs of 7 to 8½ score dead weight from litters of the same pure breed or first cross. The porkets are wanted rather fatter than the baconers, but this can be secured by judicious feeding and management.

Scale of Business.—On most farms where pig-keeping is taken up on commercial lines, it will be found convenient and economical to have enough pigs to keep a man fully occupied in looking after them. It is also desirable that the farmer should breed the pigs required for feeding. He is in this way independent of buying in the ordinary market, and avoids the risk of introducing infectious or contagious disease, particularly swine fever.

The number of pigs which a man can look after will vary considerably, depending upon the system of pig-keeping, whether the pigs are confined to sties, or kept under some modification of the open-air system, whether the whole unit is conveniently arranged or the pigs are scattered about the farm, the convenience of the water supply, and so on; but it may be taken as an average figure that a man can attend to about 120 pigs.* Taking 120 as the unit and assuming that the farmer is breeding and disposing of his pigs partly as pork at about 5 months old and partly as bacon at 6-7 months, with the sows farrowing twice a year, a herd of about 120 pigs would be maintained with 12 to 15 breeding sows and 1 boar. This assumes that the average selling age will be about 6 months, that the litter of a sow will be ready for sale by the time she is due to farrow a second time, and also that each sow rears 14 to 16 pigs in one year.

Capital Required.—The total capital required to start pig-keeping on these lines will depend upon how much has to be spent on open-air shelters and fencing. It is usually possible to make use of existing buildings with or without some minor adaptations. Strongly-made wooden shelters big enough for a sow and litter, or for 12 small stores or 8 to 10 bigger stores will cost about £10. Much cheaper shelters of a temporary

* Dr. A. G. Ruston, *this Journal*, July, 1920, p. 342.

character can be improvised. Wire pig fencing and posts at present prices will cost about 9d. per yard. It is not wise to attempt to economise by buying second-rate breeding animals. Whether it is intended to keep the herd pure or to go in for crossing, good pedigree animals should be selected as foundation stock. Useful in-pig gilts or young sows of this type will cost from £12 to £20 each, and a suitable boar, fit for service, could be bought at £15 to £25. Over and above the outlay for stock and appliances a reserve of capital of £250 would be needed for the purchase of feeding stuffs and payment of labour and overhead charges until the first returns from sales of pigs are received.

General Management.—In order to make the most of the concern the farmer will need to develop keen business instincts. He must learn when it is more economical to use home-grown grain than to sell it and buy other feeding stuffs. Such feeding stuffs as he does buy must be bought with judgment, and he must learn to make up his own rations and not rely on expensive proprietary meals.

With regard to markets it should be his endeavour to sell to the best advantage. It may not be advisable to depend entirely on the local auctions. He should watch the prices at Smithfield and other important centres and compare what he is getting locally with the prices current elsewhere. If there is no weighbridge on the farm he can, by means of a spring balance and crate, weigh representative pigs before they go to market and estimate the price he receives per score. It may be a good policy to send wagon loads direct to London—this would apply particularly in the case of small pork pigs. In the matter of bacon pigs it would doubtless be advantageous both to the farmer and to the bacon-curer to have a definite contract for the supply to the bacon factory of so many pigs at certain stated intervals. Where this is done the farmer should insist upon getting a substantial premium on all pigs which conform to the standard for first-grade bacon pigs.

It is an old saying that pork pigs are not wanted and should not be marketed in the months without an "R"—May, June, July and August. Although there is a good deal of sound sense behind this saying, it is nevertheless true that the demand for pork in the summer months has greatly increased within recent years. Many people endeavour to clear out their pork pigs before May, and then to sell in September those which have accumulated in the summer, with the result

that the markets are often overloaded in March and April and again in September.

Breeding of Pedigree Pigs.—So far we have considered pig-keeping from the standpoint of breeding and selling for killing. There is, however, the very important aspect of the position from the point of view of pedigree pig-breeding. Pedigree breeding has done much to promote the production of better pigs. There are possibly certain advantages for commercial purposes in the first cross between two pedigree breeds, but it must not be overlooked that much successful commercial pig-keeping is carried on with pedigree animals. It is often possible with pedigree stock to sell some animals of individual merit at highly remunerative prices, and these prices more than compensate for the extra trouble and time spent in recording pedigrees, in marking, and so on.

To be a successful pedigree pig-breeder, however, a man must be an enthusiast. If he is an enthusiast he should soon become a tolerably good judge, and by paying attention to careful selection and mating he should in course of time build up a good herd. Where the beginner often fails is in registering and keeping for breeding too many of his pigs.

The motto of the pedigree breeder should be to "cull hard" and to send to the butcher or bacon factory all animals except those which have real merit to recommend them. The smaller breeder who starts enthusiastically often gets disappointed through failing to find a good market for his best pigs, and there can be no doubt that collective shows and sales, when properly conducted, form a most valuable outlet for good pigs, particularly for those who are not well enough known, or are not in a sufficiently large way of business to hold successful home sales. These collective shows and sales deserve more encouragement and support.

Duties of the Pigman.—In pig-keeping a good pigman is an extraordinarily important asset. The main thing is to get a man who is intelligent, keenly observant, and thoroughly interested in his work. It is very important that he should observe closely in order to see when pigs are ill or off their food, when sows are in season, and the many other small details which collectively make much difference to the balance sheet. He should know the individualities of his sows, and if he treats them properly he will be able to handle them quietly. It is a good indication of how a man treats his pigs if he can

go up to, and handle them in the field, or if they follow him readily when they are called. An intelligent, observant pigman deserves good wages. A bonus of so much per head on each pig weaned, or on each pig which reaches a certain weight in a given time on a weighed ration will do much to encourage him and stimulate his enthusiasm.

Breeds and Suitability for a Particular Purpose.—In selecting a breed or cross the farmer must consider what he is going to sell. If his intention is to sell small pork pigs he should choose breeding pigs likely to produce animals which will suit the requirements of the butcher who purveys small pork. If his object is the production of high-class bacon he will find guidance if he ascertains the type of pig wanted by the bacon curer. It is possible that the farmer may find several breeds which appear likely to produce the particular kind of pig which he wants.

The Pork Pig.—It has been pointed out that in the case of pork there are three different sizes and weights in demand, but irrespective of weight a good carcass of pork should show a suitable proportion of lean to fat meat. There should be a small proportion of bone and offal. Great length of body is not so essential as in the bacon pig. The head should be broad between the ears, but the jowl, neck and shoulders should not be heavy. The back and loin should be broad and heavily fleshed, the ribs well sprung, the streak and belly thick and well developed, the hind-quarter square, the tail set high, the hams heavy and fleshed down to the hock. The bone should be fine, and the skin thin and not wrinkled, the hair silky and not too abundant. A heavy jowl, strong neck with crest and mane, and heavy shoulders are usually associated with a coarse type of pig. Good quality is essential, and as indications of quality attention should be paid to the bone, skin and hair. A good pork pig will have a high percentage of the most expensive cuts; these are obtained chiefly from the back and loin. For the small and medium pork requirements early maturity is a most important consideration. The pork pig, like the bacon pig, should be free from "seedy-cut." White colour and smooth skin are desirable, as a pig with these characteristics is more easily dressed. A tradesman in a small way of business is much influenced by these points, as he is usually without those special facilities for dressing pigs which are found in the factories and large wholesale businesses.

The Bacon Pig.—The ideal type of pig from the bacon curer's standpoint is a long-sided pig with muscular wide back, wide thick firm loins, heavy hams fleshed to the hock, light head, neck and shoulders, thick streak and belly, to weigh dead 140-170 lb. at 6-7 months old. The carcass should show a high percentage of lean to fat, and should be thin skinned. The "Prime Streaky" lying behind the elbow and forearm should be thick and the back fat should not measure more than $1\frac{1}{2}$ inches in depth at any point.* The middle from such a carcass will weigh 3 or 4 lb. more than the ends. This description holds good for the Wiltshire side. In the northern counties for the ham and cutting-up trade a somewhat heavier pig is wanted. The type is, however, the same, and it simply means that for the northern demand the same sort of pig will suit if fed six weeks longer.

When breeding for bacon, pigs that are poor in the hams, short in the back, with coarse wrinkled barrel-shaped sides and narrow behind the shoulders should be avoided. Heavy limbs, heavy fore-quarters, thick skins, coarse hair and bristly manes are equally undesirable.

The ideal bacon pig when fattened should be long, straight on top and underline, not "paunchy," square at the tail-head, light at the shoulder, and fine in the bone.

The ideals laid down for pork and bacon can be secured without difficulty from existing breeds.

Pure v. Crossbred Pigs.—Butchers and bacon curers want uniformity. Uniformity cannot be obtained by breeding from mongrels. The only ways in which to secure uniformity of type are to breed pure-bred animals, or definite first crosses between two distinct breeds, and as there is variation in type within some of the breeds, the breeding sows in any one herd should be as uniform as possible. It is invidious to single out particular breeds or crosses, and the following points are given simply for the guidance of prospective breeders of commercial pigs.

For Pork.—For "small pork" production the two breeds which are regarded as specially suitable are the Middle White and Berkshire. High-class small pork can be bred from either one of these breeds or by crossing the one with the other. Of the two the Middle White would appear to possess rather earlier maturing qualities, to be rather more prolific, and have an advantage from the butcher's standpoint in the white colour. A white boar used on a coloured sow, however, will usually beget white progeny.

* The "middle" is that part of the pig which reaches from behind the shoulder to the ham.

For "medium pork" as represented by the pig of 5 score (100 lb.) dead-weight, either of the two pure breeds mentioned, or a cross of either of them with one or other of the bigger breeds, would be suitable. The Middle White-Large White cross is popular in some districts, but requires good housing and conditions, and the Middle White-Large Black cross is becoming increasingly esteemed. Both these crosses have the advantage that they can be used also for bacon at 140-160 lb. dead weight. The Berkshire-Tamworth cross is favoured in certain Midland counties and has the reputation of producing a good quality carcass. This cross-bred is, however, rather slow in growing and not specially thrifty.

For "fat pork" the bigger heavier breeds might be more suitable than the Middle White or Berkshire. The Lincolnshire Curly Coated Pig has long been used for producing a fat heavy carcass. The Cumberland yields a useful carcass of this type with good hams.

For Bacon.—With regard to bacon production, Denmark produced her high-class bacon pigs by the judicious use of British White boars on the native "Land Race" breed. It has been suggested that in this country the ideal bacon pig can be most easily secured by crossing the Middle White and Large White and then mating this first cross sow with a Large White boar. The question for the farmer to decide is whether the breeding of bacon pigs in this way is the best proposition open to him, or whether by using a breed or cross which may be better adapted to his particular farm and conditions he can, by careful selection of foundation stock, still produce a useful type of bacon pig at possibly less cost. The crosses obtained by the use of a Large White boar on sows of most of the heavier breeds seem to give general satisfaction to bacon curers. Of the newer registered breeds the Welsh in particular appears capable of producing high-class bacon pigs.

As a breeder, as a milker, as a forager, and to live cheaply out of doors, the Large Black sow has many good points, and she is generally recognised as being specially suitable for open-air pig-keeping. Unfortunately, the Large Black, like other coloured breeds, suffers occasionally from the blemish known as "seedy cut." "Seedy-cut" is a black spotty discoloration of the milk ducts in the belly, and occurs in some female pigs, depreciating the value of the side. The progeny of a Black sow and a White boar are generally white and therefore free from "seedy-cut," unless there is visible black colouring along the belly, which is very rare.

The cross produced by the Middle White boar and the Large Black sow would appear to merit more attention from commercial breeders. Both parents are thrifty and cheap to keep. The Large Black sow is more suitable for rough conditions than the Large White. The Middle White-Large Black cross has the great advantage of being a reasonably good dual-purpose animal, suiting both the pork butcher and the bacon curer. It possesses early maturity in a high degree, and by those who breed it is esteemed for its vigour and constitution and the readiness with which it responds to feeding at an early age.

Although it is true that there are many more good pigs in the country now than there were in 1914, the common pig is still more or less a mongrel with little merit to recommend it, and there is great scope for general improvement. Mongrel bred boars are still used for breeding, and this is altogether wrong. Education as well as inexpensive supplies of good boars could do much to secure a sounder breeding policy. The importance of early maturity and the attainment of weight for age cannot be too strongly emphasised, but it appears that possibly too much stress has been laid by breeders upon the ultimate attainment of great size. The big majority of pigs are now wanted for killing at comparatively light weights. What is generally required therefore is a pig which will produce a ripe carcass suitable for its particular purpose at an early age. Such a carcass should be of good quality.

In the cattle breeding world, the breeders of Aberdeen-Angus cattle stand out prominently as having succeeded in developing an early-maturing breed of beef cattle of first-class quality. In the selection of their breeding stock, these breeders chose animals which along with other breed characteristics possessed fineness of bone, and we venture to suggest that in pig-breeding, if early maturity and quality are two essentially important aims, then sires and dams with fine bone must be selected. Certain pig-breeders believe that a sire should have strong bone and an appearance technically described as "sour." This may be necessary if great size is the ultimate object, but it is unusual to find those "sour" sires breeding pigs of the quality and type for which the pork butchers and bacon curers are asking. The day of the big, heavy, fat pig is over and done with, and the sooner this is generally realised the sooner the consumer will be supplied with the article for which he is prepared to pay top price.

LAND DRAINAGE WORKS FOR THE RELIEF OF UNEMPLOYMENT, 1922-23.

Owing to the continued conditions of winter unemployment among rural workers, aggravated by the depressed condition of agriculture generally, funds were again allocated to the Ministry for land drainage works during the winter of 1922-23.

In the issue of this *Journal* for September, 1922 (pp. 488-494), an account was given of the similar operations conducted during 1921-22—the first period for which money was voted for this form of relief work.

The present article deals with the second grant for this purpose, covering the period from October, 1922, to May, 1923. The Ministry addressed circulars to all Drainage Authorities and County Councils on 6th September, 1922, inviting them to submit schemes and estimates for the improvement of drainage and sea-defence works within their respective areas. County Councils were also invited to submit schemes for water supply to farms or groups of farms.

The terms and conditions set out in each of the circulars were similar to those which obtained in the previous period, the works to be completed before 31st March, 1923. The admitted success of the 1921-22 schemes, both as a relief measure and as a means of effecting solid improvements to several hundred thousand acres of waterlogged land, led to a large increase in the number of schemes submitted. It soon therefore became necessary to ration the allocations of funds in order to spread the schemes over as wide an area as possible to ensure that all rural areas received equal treatment. Eventually, however, sufficient savings were foreseen on schemes already approved to enable grants to be made in aid of all schemes which could be approved on their merits.

Unfortunately the weather conditions were not so favourable as during the previous winter, the rains and floods which occurred early in 1923 causing many schemes to be delayed, curtailed or even abandoned.

Of the 667 schemes for drainage, sea defence and water supply submitted, 531 were approved and carried out, providing employment for 1,018,976 man-days.

The local rate of wages for unskilled agricultural workers as fixed by Conciliation Committees was the normal rate in each case. Skilled men were restricted in the proportion of one to ten unskilled, and in drainage and sea defence schemes the

expenditure on materials was generally limited to about 20 per cent. of the wage estimate.

A beginning was made during October, 1922, and work proceeded smoothly until January, 1923, when flood conditions began to hamper progress, and eventually sanction was obtained for an extension of time from 31st March to 31st May. A further extension of time to 16th June was obtained in a number of special cases to secure the completion of works delayed through various causes.

Divisional Areas.—The country was divided into 7 areas for the purposes of inspection and supervision as under:—

- Area No. 1.*—The Ouse Catchment Basin, with the whole of Norfolk and Suffolk.
- No. 2.*—The counties of Cheshire, Stafford and Warwick and all counties to the westward, including the whole of Wales.
- No. 3.*—All counties northward of a line drawn from the Mersey to the Humber.
- No. 4.*—The counties of Lincoln, Leicester, Nottingham and Derby.
- No. 5.*—The counties of Essex, Kent, Sussex, Surrey and Middlesex.
- No. 6.*—The counties of Wilts, Gloucester and Somerset.
- No. 7.*—The counties of Oxford, Berks, Bucks, Herts, Hants, Dorset, Devon and Cornwall.

Numbers employed.—The numbers of men employed were as shown in the following table:—

Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.
574	2,299	4,537	6,250	7,754	8,625	9,182	8,892	4,471

The total man-months worked amounted to 52,584. The largest number of men employed during any single week was 9,879 for the week ending 28th April.

Of the above numbers it has been ascertained from inspectors' reports that 71 per cent. were ex-Service men, and that 77 per cent. were agricultural or other rural workers.

With regard to the percentage of ex-Service men it should be explained that many rural workers were absorbed on war work in a civilian capacity. In schemes near towns the percentage of ex-Service men reached 87, and in rural schemes was on an average 60 per cent.

The men have worked cheerfully and well, particularly on schemes where the work was well organised and well set out. The average man realised that here he was doing something really useful and not merely digging a hole for his mate to fill in.

Cases in which numbers of men have tramped or cycled many miles daily to and from work could be quoted all over the

Area No.	Drainage.	Sea Defence.	Water Supply.	Drainage Boards.	County Councils.	Totals.	Number of men worked.	Drainage, £	Sea Defence, £	Quantity of material supplied, £	Balance for purchase of material, £
1	58	6	3	42 4	16 2	67	230,700	66,924	2,618	280	225,102
2	82	1	5	21 1	61 5	88	97,057	32,583	2,310	544	63,791
3	26	4	1	7 3	19 1	31	73,688	21,229	6,105	27	46,760
4	51	7	2	37 7	14 2	60	197,569	35,612	31,751	11	315,544
5	27	26		20 12	7 14	53	230,018	34,157	46,273	—	122,363
6	103	3	73	22 3	81 73	179	146,560	28,792	1,919	7,307	121,937
7	38	—	15	3 —	35 15	53	43,381	9,028	—	2,189	17,151
Totals	385	47	99	182	319	531	1,018,976	228,355	93,706	10,368	912,738

£332,419

531

Note:—Expenditure shown for Drainage and Sea Defence is approximate only, and is somewhat higher than final figures.

country. The nature of the work was heavy, and in many cases was of a distinctly unpleasant nature, where many years' accumulation of mud and filth had to be removed from water courses, and where in the course of operations for sea defence in remote localities, blinding squalls of hail or rain and knee-deep wading in the marsh mud, were the daily lot over a long period.

In several cases, Boards of Guardians have co-operated with Drainage Authorities and County Councils in organising schemes with conspicuous success, enabling the local relief of unemployment at a low cost to the rates, and securing the carrying out of much larger schemes of work than the Drainage Authorities could normally afford.

Analysis of Cases.—The table on p. 521 gives an analysis of the cases dealt with in the various districts, and shows in some measure the proportionate distribution of the funds in relation to the extent of rural unemployment. The total acreage of land benefited is worthy of note.

Voluntary Schemes organised by County Agricultural Committees numbered 349, of which 250 were schemes of Land Drainage and Sea Defence executed at a total cost of £76,182, and 99 were Water Supply Schemes above mentioned for which grants were made totalling £10,358.

The most active county was Wiltshire, where no fewer than 51 Land Drainage Schemes and 45 Water Supply Schemes were carried out, providing employment for 68,590 man-days and benefiting an area of 54,800 acres.

Gloucester was another county responsible for a large number of schemes, which included 24 schemes of Land Drainage and 24 of Water Supply, providing employment for 22,326 man-days and benefiting 19,028 acres.

Other counties in which a fair number of schemes were organised are :—Warwick, Anglesey, Pembroke, Kent, Oxford, Hants, Essex, Dorset, Durham, W. Riding of Yorks, Northampton and Suffolk.

Where so many excellent schemes are included, it is difficult to particularise, but the photographs accompanying this article, which may be classed as typical of the schemes in general, illustrate to some extent the conditions met with, and the nature of the improvement works. In Cornwall, where opportunities for drainage improvements are the exception, much useful work on a small scale has been accomplished.

Many cases could be quoted where large areas of waterlogged land, some of which had deteriorated into impassable bog, have



FIG. 1.—The river Lark near Hengrave Bridge, before cleansing.



FIG. 2.—The river Lark after being cleansed.



FIG. 3. — Stream at Easthampstead, Berks, before cleansing.



FIG. 4.—The stream after being cleansed.



FIG. 5.—The river Elbe, Wiltts, before cleansing.



FIG. 6.—The river Elbe after being cleansed.

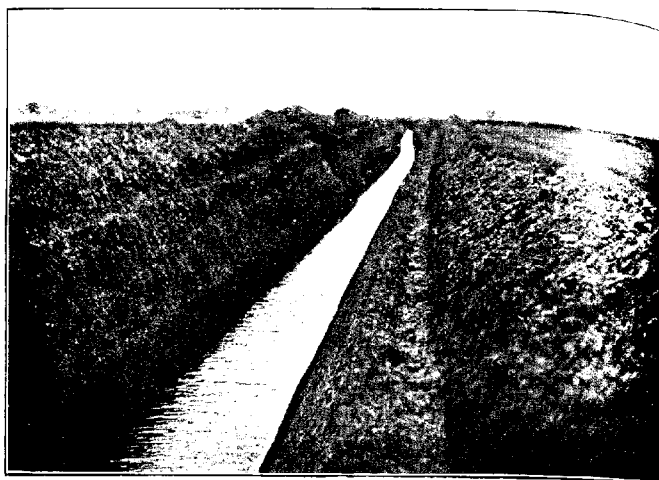


FIG. 7.—Main Drain near Crowland, Lincs.



FIG. 8.—Dengie Levels, Essex. Raising and Breasting a Sea Wall.

been reclaimed by the voluntary co-operation of owners in these schemes, through the agency of County Agricultural Committees.

As in the previous period there was a tendency on the part of owners of land at first to assume that under the conditions of working with unskilled labour, and in spite of the Ministry's grant, the work would prove expensive. However, as the schemes proceeded and it was found that such was not the case, there was a general desire for more schemes and for extensions of schemes in progress. In some cases it has been definitely ascertained that work under these schemes has been executed as effectively, and as cheaply, as it would be done at pre-war piece work rates. This reflects great credit on the officials in immediate supervision of the schemes, and also shows the desire on the part of these unskilled workers to make good.

In Kent and Sussex the schemes were mostly those for sea defence, and upwards of 12 miles of sea wall have been raised and strengthened during the winter of 1922-23, in continuance of 1921-22 work, the need for which was emphasised by the high tide of November, 1921.

It may be mentioned that the reason for the apparent reluctance on the part of some County Authorities to prepare schemes has been the lack of the necessary staff. The preparation of each scheme for submission is a lengthy task. Not only had the watercourse to be surveyed and the work estimated, but undertakings had to be obtained from the persons affected for the recovery of one-third of the cost. Where the services of a Drainage Officer had been retained, the schemes have been more in number, and wider in scope than elsewhere.

Drainage and Sea Defence Authorities were responsible for 182 schemes at a total cost of £245,879, of which amount £161,892 was spent on schemes of Land Drainage and £83,987 on sea defence.

Of the *Drainage Schemes*, the most striking achievements are those of some of the recently-constituted Drainage Boards:—

By the Ouse Drainage Board, the straightening, widening and deepening of the rivers Ouse, Lark, Ivel, Cam, Thet, Granta, etc., over a total length of 55½ miles, providing employment for 54,214 man-days; by the Chelmer and Blackwater Drainage Board, the general improvement and pioneer work on the whole of its main channels, in continuance of work commenced in 1921-22, over a length this season alone of 107 miles, providing employment for 84,118 man-days; by the River

Stour (Essex and Suffolk) Drainage Board, the clearance of the tributary streams over a total length of 35 miles, and affording employment for 23,728 man-days; by the Welland Drainage Board, works of improvements affording employment for 2,567 man-days, which works have met with much approval; by the Quadring Fen Drainage Board, and by the Loddon and Blackwater Drainage Association in improvement works of a substantial nature, conferring great benefit to a large area of exceedingly waterlogged land.

As might be expected, the majority of the larger schemes were promoted in the Eastern Counties where drainage works are a vital necessity. A large proportion of the works in the Fens was for the protection of low-lying land from river or lode flooding by the raising and strengthening of old flood embankments over a length of 60½ miles.

Sea Defence Schemes were undertaken on a large scale by the Alford and Spilsby Court of Sewers in the reconstruction of a further length of the sea defence between Skegness and Mablethorpe. When this length is finally completed, it is expected that the low-lying lands adjoining the coast and embracing 40,000 acres in this area will be rendered safe. This work afforded employment for 68,577 man-days, and could never have been done by the authorities out of their own resources. Moreover, it absorbed the whole of the unemployed over a wide rural area.

The Maldon, Wivenhoe and Clacton Drainage Board undertook its initial works in the improvement of its sea walls over a length of 90 miles. Over 25 miles of sea walls were raised and reconditioned, including repair of stone pitching, provision of groynes, and repairs to 35 sea sluices. Under the agency of this Board, the sea defences of West Clacton were reconstructed, and the area between St. Osyth and Clacton rendered safe from sea encroachment. A total of 48,895 man-days were worked on this Board's schemes.

The Arundel Sewers Commission continued the work of raising and strengthening its tidal embankments along the river Arun over a length of 7¼ miles, including repairs to sluices and the construction of groynes; providing employment for 30,548 man-days.

The Pevensy, etc., Levels Commission of Sewers continued effective groyne work on the Pett Level Frontage and have now removed all immediate danger of tidal inundation after being on the brink of disaster for several years. This work provided employment for 6,589 man-days.

Other effective sea defence work was undertaken by the Commissioners of Sewers for Dengie Levels on the repairs to sea walls over a length of three miles, and providing 9,078 man-days' employment.

Results.—(a) 385 schemes for the improvement of drainage channels, lodes and subsidiary drains resulted in 2,105½ miles of watercourses being cleared of growing and dead timber, and other obstructions; and in the improvement of sections and gradients by the removal of cesses, shoals, bends, and weed accumulations of many years. This work has effected improvement to 746,681 acres of land.

(b) 47 schemes for sea defence embraced the raising and strengthening of earthen walls, repair of stone and concrete pitching, provision of timber and fagot groynes, repairs to sluices, etc., etc., over a total length of 88½ miles, and affording protection from tidal inundation to 166,057 acres.

(c) 99 schemes of water supply were carried out chiefly in the higher portions of those counties still suffering from the drought of recent years. They included the building of concrete reservoirs and the tapping and piping of springs.

In a few cases hydraulic ram installations were carried out, and in practically all these water-supply schemes the estimated cost of materials was higher than that of labour: the Ministry's grant covered the cost of unskilled labour only.

It has been ascertained that the actual expenditure in these cases is about four times the amount of the grant, therefore affording considerable additional employment of direct and indirect labour.

* * * * *

THE MANUFACTURE OF WALKING STICKS AS A RURAL INDUSTRY.

(*From the Rural Industries Intelligence Bureau.*)

THERE are two main types of walking sticks, the natural and the artificial, or, to be more correct, "manufactured." The former are sticks which are obtained practically to shape as cut from the plantation, and the latter are the turned and artificially bent sticks which have undergone several processes before they can be termed finished articles.

Natural Sticks.—Natural stick cutting is a healthy and largely open-air occupation, but is not as a rule a highly remunerative one unless a good connection is obtained. The

stick cutter in a small way of business sometimes purchases the right to cut in a particular wood or plantation, but unless the industry is on a considerable scale, combined perhaps with artificial stick manufacture, it must be considered more suitable for a part-time or seasonal occupation than as the sole means of livelihood. It should be, however, particularly well suited to many partially disabled ex-Service men, especially where they need a country life or are unfitted for employment in urban industry.

There is a considerable demand for this kind of stick, and while the home products are by no means negligible, there is a large volume of imports, both of material and finished articles, and many sticks of both types are made of wood which is not native to this country.

There is a tendency on the part of English stick cutters to regard their processes as secret, and this may operate to restrict the home trade and narrow the numbers employed in it to a select few whose special methods of treatment are, in many cases, a family possession to be handed down from father to son. While there is no doubt that in a craft of this sort long experience provides the worker with many wrinkles, process details, and time and labour-saving devices, these can hardly be regarded as secrets. In this article, however, confined to a description of methods of working in broad outline only, they can only be incidentally alluded to.

Although we have referred definitely to walking sticks, the cutter would not confine his attention to those; there is quite a good demand for his product from umbrella and sunshade manufacturers, both for the stick and handle separately as well as combined, and there are many firms of manufacturers in London and the provinces who are always on the look out for new materials and shapes. So great is this demand that, on the Continent especially, many growers cultivate sticks of various good kinds, solely to supply this market. Little, however, is done in this way in England. Land is generally of too high a value for such cultivation, though one instance has come to our notice where in one of the home counties large quantities of ash saplings have been grown for sticks, with the roots all directed one way, to form cross heads.

The English natural stick-cutter has a large variety of materials to select from, some being more suited for umbrellas and sunshades than for sticks proper. Among them may be mentioned the following:—Ash, aspen, birch, blackthorn.

cherry,* chestnut,† crab apple, elm, furze or gorse, hazel, holly, hornbeam, maple, mountain ash, whitethorn or hawthorn, etc. When the roots have sufficient size or characteristic shape to form handles or knots the saplings are used, but sometimes also the small branches of larger trees. When cutting for sticks the total length should not be less than 42 in., and preferably 48 in., and they should be between $\frac{1}{2}$ in. and 1 in. diameter at about the middle of their length, and the diameter should diminish fairly evenly from the root to the tip. If branches are cut, a piece of the parent stem should be left to assist in forming the crook.

Dyeing, Straightening and Peeling.—Before it is ready for sale the natural stick undergoes a good deal of manipulation, and various other processes, such as peeling, trimming, bending, polishing, staining, etc., according to the requirement of the finished article. The knowledge and experience of the cutter is particularly needed in estimating, from the appearance of the growing plant, whether it is a good one for his purpose and can be made up with a minimum of difficulty.

Sticks should not be cut earlier than October nor later than the beginning of March. The best period for cutting or pulling is from December to the middle of February. After cutting they should be stacked in a cool and fairly dry place until half dry. The period allowed for this will depend a great deal upon the material and upon local conditions, and must be left to the experience of the worker; it may be anything from 3 weeks to 3 months. Artificial drying is often resorted to, but natural drying produces the better and more durable stick. When the sticks are half dry and the bark is shrunken and will not peel easily, they may be trimmed, straightened and bent as desired. Some sticks, such as oak, are best when barked entirely, others—elm, for instance—frequently have the bark left on entire except at the handle and ferrule end; in other cases they are peeled in patches, some bark being left on for ornamental purposes. As a rule the better-class stick is peeled entirely, trimmed and smoothed, and after seasoning, polished or varnished.

There are many methods of straightening, in fact, individual workers are seldom found to use exactly similar processes, and it is remarkable to those ignorant of the craft, what can be done by skill and experience in straightening and bending the most

* The English cherry is not so much used as what is known as the "tiger cherry," imported from Hungary.

† Spanish chestnut (*Castanea sativa*).

irregularly grown and crooked sticks. The following are among the more common methods of producing suppleness preparatory to bending:—

(1) The sticks may be exposed to steam vapour.

(2) A bath of damp sand is kept at a temperature about equal to that of boiling water by being placed over a very hot stove, and the sticks are plunged into this until hot and quite supple. This, or a variation of it, is the common method.

(3) Another method of drying and straightening single sticks quickly is to insert them after rough straightening into a metal tube, such as a piece of iron gas pipe, of a suitable size, boil it in the tube for about an hour, then dry it in its tube quickly, either by putting stick and tube in the chimney above the fire for 24 hours or so, or by other suitable artificial means. This method is sometimes practised on green and unseasoned sticks, but these are not as a rule durable.

There is no hard and fast rule as to peeling either before or after straightening; both methods are practised, and often by the same individual, according to the wood he is using and the class of stick he intends to make. The bark may be removed with a sharp knife, care being taken not to damage the wood underneath; or the sticks may be immersed in hot water rather below boiling point for an hour or so; or better still, they may be put into cold water, and slowly heated, water and sticks together, for about 3 hours, after which they can be easily peeled by hand.

The equipment of the small stick maker is often of the simplest and crudest description, and his straightening and bending apparatus is no exception. He usually has a stout bench running down one side of his workshop or outhouse, with the front reinforced with a heavy hardwood plank, such as 5 in. by 3½ in. elm. Into this are driven a number of stout pegs or iron staples in suitable positions and of varying heights by which he can get any purchase he wants, either for straightening or crook bending. Another straightening appliance is merely a notch cut in a stout piece of wood set on end, and at an angle to the worker, in which the stick is inserted at various points where alteration is required, while the eye can glance along it during the operation. When finished it is put on one side to cool, which it should do with little or no tendency to revert to its original shape. A more elaborate method used for better-class sticks, or those made of more stubborn wood, such as holly, oak, hawthorn, etc.), is that of the straightening boards; these are wide and thick pieces of wood, generally beech, with a number of straight grooves of various widths cut in them. The sticks to be straightened are placed in the grooves while hot and pliant, and secured against

one side by wedges driven in at intervals and left to dry as fixed. Semi-circular crutches can be bent by immersing the end in boiling water for from 10 to 15 minutes, then bending it to the desired form either by hand or by means of a couple of staples in the bench; the crook is then secured in this position either with a tourniquet or by being placed on the bench with small pieces of wood nailed down round it.

Apart from the common curved handle, sticks can be bent or twisted by the application of heat when in this pliant state to almost any shape in reason, such as the twists, curls and spirals seen in some fancy sticks; while umbrella and sunshade handles, especially those made of cane or bamboo, are sometimes even tied into knots. After bending, straightening and trimming, the sticks are put into a dry airy place, not too hot, to get thoroughly dry and seasoned. Single sticks may be hung up with a weight on the end to keep them from warping, but the usual practice is to tie a bundle of them tightly together, and they then keep one another straight. The tendency to distortion should not be very great if the straightening has been well done. Some workers hasten this process by carrying a brick flue from their fire up through the loft or other drying place. The sticks must anyway be so arranged that air can get thorough access to them.

Finishing.—The finishing processes vary widely according to the quality of the stick, the purpose for which it is required, and the material of which it is made. They range from no finishing at all beyond perhaps putting on a ferrule, to the most elaborate trimming, smoothing, staining, polishing and carving, according to customers' requirements. One or two of these finishes may be indicated as follows :—

(1) Some sticks (*e.g.* hazel) are merely buffed up with a wax mop to give the bark a natural sort of gloss, and the hook end trimmed up and carefully rounded off and touched up if required with a hard slow-drying varnish.

(2) Elm sticks with the rough bark left on must be trimmed clean round the neck and on the handle or knob, and at the ferrule end for an inch or two, any loose bark on the stem being also cut away. It is then smoothed a little with sand paper, coated with boiled linseed oil and allowed to dry. When dry, the smooth parts should be polished up and the whole varnished with hard varnish—one or two coats as required.

(3) In some cases hazel, ash, holly, birch or apple sticks have only a part of the bark removed and the knots or other protuberances smoothly trimmed down. They are then rubbed over with glass paper, dressed with boiled linseed oil, and dried, polished and varnished as in (2). Hawthorn sticks may be treated in the same way, while oak sticks are best entirely stripped of bark and then treated similarly. The trimming may be done with a spokeshave, a small plane, or a knife.

(4) The forming of handles and knobs must be left to the discretion of the worker; much depends on the natural shape of each stick and the use to which it is to be put. For fancy sticks, the knobs and handles may be elaborately carved, but if for ordinary use, they are better smoothed and rounded to fit comfortably into the hollow of the hand. To the experienced worker the shape of the root in the rough will itself usually suggest the most suitable treatment.

(5) Sticks and umbrella handles are often stained, particularly when they are trimmed smooth all over. This may be done either by putting on the stain hot with a brush, or by immersing the stick in a heated solution; the former is the mode most commonly adopted by the small maker. Staining should be done before the sticks are dressed with linseed oil. Stains in a great variety of tints can be so easily and cheaply purchased with full directions for their use, that it is hardly worth while to describe methods of making them up, but a very good black stain is obtained as follows:—

After smoothing, but before oiling, brush the sticks over with a hot and strong solution of logwood and nutgalls, and when this is quite dry, brush them over again with vinegar or acetic acid, in which a quantity of proto-sulphate of iron, iron rust, rusty nails or rusty iron filings have been lying for some days. Other methods of colouring may be obtained by adding tinting materials to the polish used, such as dragons' blood, to produce a mahogany colour, or yellow ochre to produce a yellow coloured stick. Further details on these processes can be supplied if desired.

(6) Fernules can be bought much more cheaply from wholesalers than they can be made, and can be obtained in a variety of sizes and qualities. They should be fixed with two small screws or nails, one on either side, to prevent them falling off, when the stick shrinks in dry weather.

Artificial or Manufactured Sticks.—This section of the industry, although carried on abroad to a considerable extent as a rural one, is perhaps unlikely to interest the small and local worker in this country to any great degree, but the following description is typical of several village factories in Austria and Hungary. Considerable use is made nowadays of machinery and power, and mass production is essential under modern and factory conditions. Large use is made of foreign, and often rare and valuable woods, which are specially imported for the purpose; and instead of the naturally shaped saplings, seasoned timber is mostly used, which is cut up as required, turned or otherwise machined to shape, and bent by machinery. In the manufacture of the higher quality of sticks and parasol handles, workers in gold, silver, precious stones, ivory, etc., are often required as well. There is no doubt, however, that some of the methods in vogue are more or less applicable to the rural worker, who might well devote his attention to making a certain proportion of the so-called artificial sticks

with the aid of wood-working machinery of a more or less elaborate kind, according to his circumstances or the volume of his business, and for this reason it is thought that the following brief general outline may usefully be given here.

When green timber is to be employed it is cut into scantling or heavy planks, and then subjected to much the same methods of seasoning as that referred to in the case of natural stick-making, except that it is more common to find artificial means of hastening the process resorted to. The timber now seasoned and dry is cut up into rods of square section, and this cutting is done so as to make the greatest possible use of the run of the grain. Skill and experience are necessary to make a proper selection here, particularly when rare and valuable woods are in question. These rods are from 42 in. to 48 in. in length, and after cutting they are rounded in a special lathe which turns them to the exact shape or taper required.

Various types of lathes are used, such as copying lathes which will turn two or three sticks at a time, working from a rotating metal former. Sometimes what is known as a golf-stick lathe is used: this is rather an expensive and specialised machine, but is in some respects merely a special sort of combination copying and profile lathe. The profile lathe is quite suitable so long as attachments are provided to support the long and slender piece of wood whilst it is being turned. A profile lathe is a copying lathe in which the rotating former is replaced by a fixed metal or hardwood template.

The small worker could quite well use the simple wood turner's lathe with some form of support to prevent the stick being broken or forced out of centres whilst turning. With such a machine, however, the output would not be so great. It is a common, but not invariable, practice to leave the crook end of the stick square or rectangular in section until after bending. Machine bending is done more safely and satisfactorily with the wood in this shape, and the handle can be finished to shape more perfectly afterwards. This shaping is sometimes done by hand-tools, but the rapid method is to use a rotating fly-cutter in the ordinary wood machinists' vertical spindle machine. The cutter is shaped to the quarter of a circle, and by means of jigs the inside and outside of the crook can be shaped in a few seconds. The stick is then turned over and the other side treated the same: the neck piece still remaining of square section between the handle and the stem is then trimmed down with a spokeshave. In the factory

these operations are generally done by girls, and the smoothing of the rods, instead of being done by hand, is more rapidly effected on a belt-type sand-papering machine. The softening of the sticks for bending is done by steaming them in a special apparatus supplied with low pressure steam (about 10-20 lb. per sq. in.) from a boiler. This boiler also supplies steam to the staining plant. The steaming drum is used for taking full length sticks, and a steaming box of a different and more compact type may be employed when handles only are being made. Both are arranged to be kept continuously in action, having a number of compartments which can be filled and emptied successively without disturbing the others. The steaming process occupies from 1 to 2 hours, varying with different timbers, and from 10 to 20 dozen sticks or handles can be steamed at a time. The hot and flexible sticks, when ready, are taken to the power-driven bending machine in which they are held by an adjustable cramp with a spring steel strap and bent round a heated circular former of chilled cast iron, which is removed with the stick when bending is completed, and a fresh one inserted ready heated for the next stick to be operated on. The bent stick remains attached to the former by the bending cramp until cold, and the heat remaining in it dries the stick out completely at the same time, without charring the wood at all. The bends take about $1\frac{1}{2}$ to 2 hours to dry and set. The above methods ensure a large and rapid output of uniformly bent handles. This method is chiefly used where handles are separate from the stem, enabling an ivory, galilith or erinoid washer to be inserted between the two for ornamental purposes.

The end is prepared for ferruling by a special rotating cutter rather similar to a spoke trimmer which tapers the end of the stick an exact fit in the ferrule, which is then driven on and stamped in a fly-press to produce two small depressions of the ferrule into the wood to hold it in place; it is seldom that the factory-made stick has the ferrule screwed or nailed.

This description of the manufactured walking-stick industry is intentionally no more than a brief outline. The Bureau, however, would be glad to give information in greater detail to individual inquirers if desired. Application should be made to *The Secretary, Rural Industries Intelligence Bureau, 258/262, Westminster Bridge Road, London, S.E.1.*

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GROWING RED CLOVER SEED IN WALES.

V. S. ELLIS, P.A.S.I., and R. D. WILLIAMS, B.Sc.

For many generations two districts in Wales have been famous for their red clover (1) the Vale of Clwyd and extending from Abergele and Rhyl on the coast up to several miles above Ruthin, and (2) that portion of Montgomeryshire extending to a radius of from 10 to 15 miles round Welshpool, and a little over the border of Montgomeryshire into Shropshire in the vicinity of Chirbury.

Experiments conducted at the Welsh Plant Breeding Station, Aberystwyth, with different nationalities and strains of Red Clover and extending over a period of four years, have demonstrated most conclusively that Montgomeryshire Late-flowering Red Clover is very considerably more persistent than any foreign Red Clover. The relative yields during the second harvest year of Montgomeryshire Red, Cornish Marl Red—a strain grown in Cornwall which is very similar to that grown in Montgomeryshire—and some of the most common foreign nationalities are given below:—

Montgomeryshire Late-Flowering Red	...	...	100
Cornish Marl Red	...	...	100
Canadian	...	...	46
Chilian	...	...	24
Italian	...	...	0

As the experiments on the Vale of Clwyd Red Clover were only commenced in 1922 comparative figures are not yet available.

Similar experiments have also been carried out in the past at the North of Scotland College of Agriculture, and here again Welsh Red Clover has shown excellent results as compared with the other varieties.

The strains grown in the two seed-growing centres in Wales are quite distinct, although both are highly persistent types of the late-flowering red. A broad red type of clover is also grown to a limited extent in the Vale of Clwyd. It has been claimed that this strain is more persistent than the English Broad Red and that it lasts well into the second harvest year. The two late-flowering strains characteristic of Wales may be briefly described as follows:—

Montgomeryshire Red is a very "late-flowering" strain. It is easily distinguished from other strains of "single cuts"

by its very dense tufted habit of growth and by its relatively small leaves. The plants are generally sub-prostrate during the early stages of growth. It tillers more freely than any other strain except the Cornish Marl. It does not afford much keep during the winter and early spring, but, though late in commencing active growth, it will usually give a very heavy late hay crop. Its aftermath, as compared with that of English Broad Red or even English Late-flowering Red, is poor. Its outstanding quality is its persistency, and it is therefore pre-eminently suitable for seeds' mixtures intended to be down for three years or more. It is undoubtedly one of the best clover strains for pastures.

Vale of Clwyd Late-flowering Clover is, on the other hand, a medium early "late-flowering" strain. It is usually sub-prostrate to semi-erect in habit of growth. The leaves are appreciably larger than those of Montgomeryshire Red. It tillers freely but not so much so as the Montgomeryshire strain. It yields, however, better grazing during the winter and spring, and gives an earlier hay crop and more aftermath. A high degree of persistency is claimed for this strain, but it is not such a good plant for grazing purposes as the other Welsh strain.

As the superiority of Welsh Red Clover over other strains for lasting into the third and fourth years and for its hardiness has been clearly demonstrated, steps have been taken with the object of fostering the growing of this seed and of improving the facilities for cleaning and marketing.

With this end in view two conferences were convened last year at Welshpool and Denbigh, in the respective areas in which this seed is grown, and were attended by all the principal growers in the districts. As a result of these conferences a subsequent meeting of growers took place at Denbigh last September when an Association was formed and called the "Vale of Clwyd Red Clover Growers' Association," and last January a similar Association was formed at Welshpool to be known as the Montgomeryshire Welsh Red Clover Seed Growers' Association. Similar rules and regulations, providing for the certification of the true strains and the testing of the seed under the Seeds Act, 1920, were drawn up by each Association.

Although the quantity of seed available each year will vary in amount owing to the uncertain climatic conditions existing in Wales there is no reason why the acreage at present under

these clovers should not be considerably increased as the excellent qualities of the seed become more extensively known.

A good deal still requires to be done in the way of improving facilities for cleaning, and, what is even more important, the earlier threshing of the seed so that it can be cleaned, tested and placed on the market at the commencement of the following seed season.

If the growers will only now seize their opportunity and give their whole-hearted support to the two new Associations formed there appears to be no reason why in a few years' time the true strains of Welsh Red Clover should not have a world-wide reputation.

It also is interesting to note that at a meeting of the Committee of "The Vale of Clwyd Association, held at Denbigh on 27th June, it was decided:—

- (1) To appoint a qualified botanist for the purpose of inspecting the clover fields so that the true strain could be certified; and
- (2) To concentrate on the development of the permanent late-flowering Red.

The Secretary of the Vale of Clwyd Society is Mr. Arthur E. Roberts, 131, High Street, Rhyl, and of the Montgomeryshire Society, Mr. Havercroft Jones, Wesley Street, Newtown, N. Wales, to whom all inquiries regarding the purchase of this seed should be sent.

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GARLIC-SCENTED PENNYCRESS: A WEED NEW TO BRITAIN.

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GARLIC-SCENTED Pennycress (*Thlaspi alliaceum*) is an annual plant closely related to the Pennycress (*Thlaspi arvense*) already familiar to farmers as a weed of arable land. Examination of a weed-infested arable field in the neighbourhood of Hothfield, near Ashford, Kent, in May, 1923, led to the discovery that Garlic-scented Pennycress was present in abundance. This plant, a native of south Europe, does not appear to have been previously recorded as a weed in Great Britain. The area infested was 15 acres farmed under the Norfolk four-course rotation. The crop taken in 1922 was wheat in which the weed occurred sparingly, but owing to continued wet weather in autumn and

spring, the soil, a heavy clay, was unworkable and weeds consequently covered the stubble. The plants on the field were so numerous in May, as to resemble a crop being grown for seed. The average height was approximately two feet.

Description.—Individual plants show erect habit of growth; the majority have four to ten branches arising from close to soil level and occupying considerable space (Fig. 1). The whole plant is free from hairs, and when bruised emits a strong garlic—or onion-like smell. The lower leaves clasp the stem and the upper are provided with short stalks, though on the mature plant the majority have usually withered or fallen. The flowers are white, small and inconspicuous. The fruits or pods are borne on slender stalks in great numbers on all the stems, and their edges are flattened to form a narrow rim or “wing” which is notched at the top. They differ from those of *Pennycress* in that the latter are longer, broader, and are provided with a larger “wing.” The difference in shape of the pods and of their central membranous partitions is shown in Fig. 3.

To each side of the membranous partition within the fruit, three or four reddish brown seeds are attached; these can easily be observed if the two “valves” of the fruit be removed. Fruits of common *Pennycress* contain seeds of much the same colour and size* as those of Garlic-scented *Pennycress*, but in greater numbers and having the seed coat marked with very conspicuous ridges which are approximately parallel to the outline of the seed. The seed coat in the case of *Thlaspi alliaceum* is ridged, but less conspicuously, and the ridges themselves are pitted throughout their entire length (Fig. 2). The fruits and seeds ripen at the middle or end of May.

Origin.—As already indicated, this weed is a native of south Europe, where it appears to be of general distribution. Specimens in the European Herbarium of the British Museum are labelled as follows:—Stiria, Salzburg, Loire Inférieure, Piedmont, Italy, Sicily, Croatia, and descriptions in Continental Floras† indicate that in addition to the above, it is found in Spain and Rumania.

It is of interest to note that in the British Herbarium, at the British Museum, there is one specimen with incomplete description, presumably collected in Britain. This was origin-

* The average size of the seed is 1·8 mm. × 1·3 mm.

† *France*: Rouy et Foucard II, 146, *Flore de France*, 1895.

Italy: Parlatore, Filippo, IX, 694, *Flora Italiana*, 1890-93.

Spain: Willkomm et Lange III, 776, *Prodomus Florae Hispanicae*, 1880.



FIG. 1. *Thlaspi alliaceum*, Cardi-headed Pennywort. (The



FIG. 2.—*Left*, seeds of *Thlaspi alliaceum*.
Right, seeds of *Thlaspi arvense* (Pennywort).
 All $\times 10$.



FIG. 3.—*Left and right*, mature fruit pods of *Thlaspi alliaceum*.
Center, mature fruit pods *Thlaspi arvense*.
 Natural size.

city in the Lightfoot Herbarium and is therefore approximately 150 years old. *Thlaspi alliaceum* is mentioned by J. C. Loudon in his *Hortus Britannicus*, 1832, and in connection with this plant, under the heading of "Year of introduction of Exotics," appears the date 1714, though no other particulars of its occurrence in Britain are detailed in this or later editions of his work.

Occurrence on Arable Land.—Reference to the labels of the Herbarium specimens mentioned above, shows that this plant is a weed of arable land on the Continent, being found in crops of cereals and of lucerne. It has been reported in one instance in Italy as constituting a large proportion of the fodder fed to certain oxen which had suffered in consequence, and from information in the Floras mentioned above, it would appear to be widely distributed, being found in vineyards, fields, hedges, woods and grassy places. It is described by Woods* as occurring in arable fields of mid and south Europe.

It has probably been introduced to England as an impurity in some such seed as that of lucerne or red clover, but the farmer at Hothfield could give no exact information on this point; he stated, however, that he had observed the weed for many years.

Harmful Properties.—When once allowed to ripen and shed seed, it is evident that this weed can do considerable harm, either by necessitating increased cultivations to eradicate the seedling plants or by its smothering effect on crop plants if allowed to grow to maturity. In the latter event the seeds are ripened early, and in most cases will be shed before the weed can be removed with the crop, thereby increasing the infestation in the following year. The soil of the field under observation was so thickly coated with the seeds that in places it assumed a reddish brown colour. Samples of the soil, removed to the laboratory, were dried and crushed, with the object of carrying out an estimation of the seeds they contained. The soil had a strong odour of garlic.

Some idea of the number of seeds deposited in the soil was obtained by counting the plants on measured areas,† the average number of pods per plant,‡ and seeds per pod.§ This amounted to 79,768 seeds per square yard.

More direct harmful properties may be attributed to this

* Joseph Woods, *Tourist's Flora*, 1850.

† Average 13 plants per square yard.

‡ Average 767 pods per plant.

§ Average 8 seeds per pod.

plant. In May, 1917, a case of poisoning of oxen is recorded by Beguinot,* in Italy. Of 40 poisoned animals, 8 had died and their fresh-cut fodder, when examined, was found to consist largely of *Thlaspi alliaceum*. No other cause of poisoning or death was found, and the author advises that neither this species nor ordinary Pennycress (*Thlaspi arvense*), should be allowed as an impurity in fodder. It is further stated to cause tainting of milk if eaten by cows. In connection with this, it is of interest to note that Pennycress (*Thlaspi arvense*) is known in Canada as "Stinkweed," though not possessed of such a strong odour as that characteristic of *Thlaspi alliaceum*.

Eradication.—Garlic-scented Pennycress being an annual, and propagated entirely by seeds, must be dealt with before the fruits have ripened. Harrowing and subsequent hoeing should be practised, as in the case of charlock, until the plant is in flower. After this stage it is advisable to hand-pull and burn, care being taken that no plants with immature pods are left to be ploughed in, as it is quite possible that such fruits may ripen seed below the soil. Unless such measures are adopted, the land will become infested with the seeds as above described. In the case under consideration the farmer has repeatedly noticed that when a cereal crop was being taken a heavy seeding invariably resulted in partial suppression of the weed.

Under normal conditions, i.e., when cultivations are not adversely affected by the weather, there is no excuse for its becoming a pest, and there seems no doubt that this weed can be effectively controlled.

The writers desire to express their thanks to the Director, Royal Botanic Gardens, Kew, for identification of the plant. They are also indebted to the following gentlemen for information kindly supplied: Mr. C. B. Saunders, Chief Officer of the Official Seed Testing Station, Cambridge, Mr. A. J. Wilmott, British Museum (Natural History), London, and Mr. H. C. Long, Ministry of Agriculture.

* Augusto Beguinot, in *Atti dell' Accademia Veneto-Trentino-Istria*, Vol. X, pp. 99-110. Padua, 1917.

Abstract in *International Review of the Science and Practice of Agriculture*. Year IX, No. 6. Rome, June, 1918.

POULTRY-KEEPING AND FRUIT CULTURE.

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THE advantages of running poultry under fruit trees are becoming more generally recognised and the practice is spreading rapidly, especially in Cambridgeshire. From the point of view of the poultry keeper, the rent of the land is paid by the fruit, and ample space together with a generous supply of insect life is obtainable free of cost. Further, an immediate use is found for the manure without any trouble of storage or transport. If the advantages from the poultry keepers' point of view are great, those secured by the fruit grower are even greater. A great part of the expenditure on labour and material required for spraying the trees and manuring and cultivating the land is saved.

Many of the principal insect pests of fruit spend much of their time on or in the soil, and it is at these times that they are caught and consumed by poultry. All kinds of caterpillars, maggots, aphides, and even weevils, are readily devoured. Some of the worst pests of fruit, such as weevils, pear midge, maggots, etc., are more effectively dealt with in this way than in any other. In addition, the land can be cleared of such harmful insects as leather jackets, wireworms and ants (which are so active in spreading the dreaded purple aphis).

Organic manure is a source of expense and difficulty to the fruit grower and this can be largely supplied by poultry. Many fruit plantations are so starved that only small crops of poor fruit are obtained, and an immediate improvement would result by the introduction of poultry. A number of instances are to be seen of the effect of the poultry running in the orchards as against orchards on adjoining land not so stocked. The greater vigour of the trees in the former case seems to enable them to withstand frosts and attacks of disease, which have this year done much damage. Successions of good crops are reported from plums, and there is little doubt that for increasing the size of the fruit, poultry manure is unsurpassed.

The cultivation of the land in fruit plantations is another expensive item, and this can be done either wholly or in part by poultry. With bush fruit and young apple, pear and plum trees up to five or six years old, it is essential to keep the land cultivated, but the amount of cultivation required will be con-

siderably lessened by poultry. With older trees, however, no cultivation is necessary. Two hundred hens per acre will keep the land clean. One hundred hens per acre will largely keep down grass, etc., and will secure the high colour of apples without the reduced size generally associated with grass orchards.

Various methods of combining poultry keeping with fruit culture have been adopted by different growers with success, and a brief description of these is now given.

Mr. J. G. Faircliffe, of Burwell, Cambs, has run poultry under fruit trees for twenty years in the orchards (extending to some 50 acres) of Mr. R. Stephenson at Exning. He also has a younger plantation of about 5 acres of his own at Burwell, where he puts into practice his latest ideas. At first large houses placed at one end of large enclosures were made. In his experience, however, the poultry only worked near the houses, and the size of both pens and houses has therefore been reduced and the houses placed in the centres of the pens. At Exning the pens are now five to the acre and each holds 2 dozen laying hens. At Burwell the pens are 15 to the acre and each holds 10 hens. In either case sufficient pens are reserved for chicken rearing. Light breeds were preferred at first as they work more ground, but it was found that they will get up into bush apple trees and strip them of fruit when half grown. The light breeds have therefore been abandoned in favour of White Wyandottes and Rhode Island Reds. Runner ducks have been found to improve rough ground more quickly, but this advantage is considered to be outweighed by their failure to lay when checked by a cold snap in winter or otherwise upset. The trees at Burwell are twelve to fourteen years old. They have had poultry amongst them for seven years and have carried five or six consecutive heavy crops. No spraying has been necessary, and what may be considered proof that the poultry deal effectively with the pests is to be seen in the actual presence of only small numbers of the various caterpillars, blue and green aphids, apple blossom weevil, etc., which in a season such as this would have increased largely but for the activities of the fowls.

Mr. T. H. Langan, Willingham, has run poultry under his fruit trees for several years. He states that a plantation of Victoria plums in the fen district had never produced anything but "skin and bone" until he put in poultry. Last year he secured a first-class sample of large plums and this year it has one of the few crops in the district. At another orchard half acre pens were made and an intensive house with 100 hens was put in

each last September. Mr. Langan is now trying a plot of several acres with a large house in each corner. At the blossoming period, the apple trees around the pens were very forward in leaf and blossom, while those further away were rather weak and backward. The large amount of ground worked by Anconas—much larger than Leghorns or any heavy birds—was very marked. Mr. Langan has 2,000 layers and has recently installed a Mammoth incubator with capacity for 4,000 eggs and a plant capable of rearing 6,000 chickens. He intends to increase his hatching capacity very largely next year.

Messrs. Chivers & Sons carry on their various farms a large head of poultry, consisting of Light Sussex, White Leghorn and White Wyandotte; the first breed is much favoured. The main poultry operations are centred at one farm under the charge of an experienced poultry man with four assistants. The stock are bred and the chickens hatched and reared in the early stages at this farm. The total incubator capacity is about 7,500. The breeding stock is trap nested and very carefully selected, and good laying strains of all varieties have been established. The young stock are drafted out at 8 to 12 weeks of age, and later some of the best pullets are brought back to the poultry farm into large flock houses and trap nested. In the extensions now anticipated, the laying flocks will be in units of 350 with approximately 140 birds to the acre.

The pens vary considerably in size from $\frac{1}{2}$ acre up to $2\frac{1}{2}$ acres, but in most cases the land is kept cultivated. In some cases the trees are widely planted and there are two runs to each house—one growing a crop of greenstuff, while the other accommodates the poultry. This system both provides greenstuff for the poultry and prevents the land becoming foul. Where the trees are planted at the usual distances, greenstuff is not grown, but is supplied to the birds from other land, and the fruit land is kept cultivated. Chicks in the early stages are run on grass under the trees.

The stocks of poultry, which are pure bred and of good strain, are particularly vigorous and healthy. The conditions, which afford ample range and every inducement to exercise, lead to vitality and good results in breeding and rearing. Although it is sometimes stated that laying hens do less well under trees during the autumn and winter months than under more open conditions, there is no evidence to prove that this has any effect in checking egg production. The returns reported during these months are very satisfactory, and it is probable that the shelter

which is afforded in the orchards from the north and east winds is a set-off against damp during the rainy season. The benefit of the shelter from sun during the summer months is a very distinct asset to all the stock, particularly to the young birds.

No general system of housing is followed by the different breeders. Scratching sheds of large type and smaller colony houses are used for the laying birds. Although the provision of scratching sheds may appear to some extent to defeat the object of keeping the poultry to benefit the orchards, in that they would roam less, there is no doubt that with large flocks scratching accommodation is a wise provision. It is unnecessary, however, where the flock unit only amounts to ten or twelve birds.

It is probable that, as claimed in one instance, the small flock is preferable from the point of view of poultry production as well as for the sake of the orchard, where operations are upon a small scale. Upon a larger scale, however, the additional supervision of employed labour, the extra labour required, and the additional cost of equipment, are all in favour of larger flocks.

In the same way in the feeding of wet and dry mash, both of which are practised, the latter system is of great advantage to the fruit grower whose orchards are frequently at some distance apart, even if the results from the poultry should be less good. The preparation and distribution of wet mash under these circumstances adds considerably to the labour. Feeding costs are, however, frequently cheapened by the use of surplus potatoes, and this necessitates a wet mash. It is worthy of note that the ration of animal food in the mash fed to fowls is considerably reduced during the periods of cultivation.

The capacity of a fruit grower for long and irregular hours of work and his essentially practical and observant nature, make him particularly adaptable for the successful management of poultry. The fact that both poultry and fruit trees require constant attention is an added advantage, as when run in conjunction, important details in management do not long escape attention.

A method advocated by one of the pioneers in this area for establishing a new orchard, is to plant small fruit between the young trees. The returns from the small fruit meet all expenses in the first few years, after which poultry are turned in as the trees commence to come into profit. During the ripe fruit season, poultry would be likely to damage small fruit, and they should be removed to other quarters at this time.

There are still many established orchards which would benefit largely if stocked with poultry, but the cost of equipment is a consideration, since a good deal of wire netting is required. It is generally found, however, that 5 ft. netting is sufficient for any purpose, and in some cases 4 ft. netting is used where only heavy breeds are kept. Bad fruit seasons, however, are those in which more attention is called to the value of the poultry in controlling the many pests to which fruit trees are subject.

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LAVENDER: ITS CULTIVATION FOR MARKETING AND DISTILLING.

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LAVENDER has been grown commercially in the south of England for a great many years, having been introduced in 1568, and where the soil and situation are favourable, there is no doubt that it is a profitable crop and worthy of consideration. Lavender is grown for sale in a fresh state as "bunched lavender," for sale as "dried lavender" for sachet making, &c., and for the production of oil of lavender for perfumery purposes. As regards oil production it is pointed out that chemistry has not yet succeeded in producing a synthetic product which can claim to be a substitute for English Oil of lavender, and hence the supply depends wholly upon the natural product. The variety grown, and which should be grown, commercially in England is *Lavendula vera*, of which several strains exist, and usually referred to as "English" lavender. The chief lavender growing districts in the past have been in the neighbourhood of Mitcham, Hitchin, Canterbury and Bournemouth, the Mitcham oil of lavender having become world famous as a product unequalled by that of any other country.

Soil and Situation.—Too much stress cannot be laid on the importance of soil and situation. These are the factors governing success, and should be carefully considered before steps are taken to plant any large area. In common with all plants containing a high percentage of oily matter, lavender needs very little moisture and does best in a calcareous, stony, well-drained soil in dry sunny situations. The ideal soil is a light brown loam overlying chalk, although sandy loams, provided

good dressings of chalk or lime are applied, may be utilised. Heavy soils which hold water are not suitable.

Situation is quite as important as the soil, if not more so. Lavender is by nature a sub-tropical plant, although found at high altitudes. It is liable to injury by frost and hence low-lying situations and those prone to become weather-bound in winter should be avoided. Even under favourable conditions in England a hard winter may result in a number of plants being killed by frost. The situation should be exposed and sunny, preferably sloping to the south, and protected, if possible, from the prevailing summer winds by a belt of trees or a high hedge. This matter of protection is important, as considerable damage may be done by high winds when the tall flower spikes are being carried by the plants during July and August.

Preparation and Cultivation of the Land.—It is supremely important that the land be properly prepared by deep and thorough cultivation. Potatoes which have been well manured make an excellent forecrop, as the thorough working of the land will prepare the way for the lavender.

After planting it is essential to keep the land in a thorough state of cultivation while the plants occupy it in order to secure a good annual throw of bloom. If possible a horse-hoe should be used for this purpose and the land worked both ways and as close to the plants as possible.

Plants and Planting.—The plan most favoured after a supply of plants is secured is to plant them out 18 in. \times 18 in. very carefully on the square. When these plants have occupied the ground for one year, each intervening plant and those of every other row are taken out, leaving the land planted 36 in. \times 36 in. The plants so removed will be utilised for planting up fresh ground, each being divided into about three. Before being planted the plants should be trimmed at the top and the rough roots removed to where the fibrous roots have developed. The usual practice is to use a straight chopper and clean wood block for preparing the plants for replanting.

Planting should be done in October or early spring. November and the winter months should be avoided, as the plants are then liable to injury by frost and snow when out of the ground. It is important to plant very deeply. Special dibbers are used not less than 14 in. long, and the plants should go into the ground up to within 2 in. of the top and be very firmly closed in.

In commercial practice the bushes are seldom retained after their fifth year, after which they should be grubbed and burnt. It follows, therefore, that in order to keep up a continuous supply of bushes in their prime, planting and grubbing must, in an *established* plantation, be done every year. Most growers plant, say, a fifth portion of the ultimate area of lavender aimed at in the first instance and this is repeated each year until the fifth year, when the area first planted is grubbed immediately after flowering and the land fallowed. It is an advantage to have a sixth piece of land available for planting in the fifth year in order to give the land, which has carried lavender for five years, one complete year's rest from the crop. During the first year in the permanent position the plants are better for not being allowed to flower but should be kept trimmed with a pair of sheep shears to promote bushiness.

Marketing the Crop.—The lavender is ready for market when the middle blossoms of the spike are widely open; the lower blossoms will then be fertilised and the top blossoms showing the bloom of the bud. When sold as bunched fresh lavender the stalks must be cut as long as possible, cutting well into the bush (this also serving the purpose of cutting back the bush at one operation). The cutting is done by a small sickle having a toothed edge, and should be done as late in the evening as is compatible with despatch for market. Bunches for market are about 12 in. in diameter, tied with raffia as long as possible to the butts. Six of these bunches are tied together in bundles.

When sold as dried lavender the flowers are dried on the stalk and are subsequently removed by hand or with the aid of a sieve. There is a considerable loss of weight during the drying process and only about a fifth of the weight of fresh flowers will be available as the dried product. The lavender is dried by being spread out thinly on shelves in a dry shed for about six weeks.

Distilling.—The founding of a lavender plantation for the purpose of oil production is an enterprise which requires careful consideration beforehand. It will be necessary to provide a small distilling plant on the grower's premises unless arrangements can be made for the distillation of his crop at a local distillery.

Beyond reference to the facts that the still should be of the shallow body type and be worked by steam from a boiler the technique of distilling cannot be discussed here. E

When cutting for distilling, the blooms must all be fully out, generally about a week later than for market. The cutting should only be done in the sunshine, the cut laid on clean dry mats, and covered from sun scorch immediately. There must be no moisture in the stook, neither must it be dried up by wind or sun. The mats will be rolled up in the cool of the evening before the dew is falling and carted to the still.

For some purposes the stalks are shortened to about 6 in. before stilling, but generally the whole of the contents of the mat are placed carefully in the still right away.

The grower carts his own lavender to the still, if he possesses no distilling plant of his own, and superintends the boiling and watches for the "Oil-run."

The yield of oil is apt to vary considerably from season to season, as the age of the bushes and the weather will affect both the quantity and quality of the product.

Roughly speaking, 1 cwt. of fresh flowers with six inches of stalk will yield about 10 oz. of oil. An acre of lavender in its prime would in a favourable year yield from 15 to 20 lb. of oil, but taking the whole of the area planted as directed above an average yield of 12 lb. to the acre would be a fair estimate. The market value of the oil is constantly fluctuating and its use in perfumery is influenced considerably by the price of alcohol. It is a noteworthy fact that English oil of lavender enjoys a very much higher value than imported oils.

After distillation the oil is matured in the dark, for from 3 to 5 years, stored in blue glass jars known as "Winchesters" holding about 80 oz., but as this is usually done by the merchants it does not concern the grower, unless he elects to store and mature his own oil.

Lavender Disease and Pests.—Lavender is unfortunately often severely attacked in this country by a fungus disease known as "shab" or "wilt," which is caused by the fungus *Phoma lavendulae*. The disease causes wilting or shrivelling of the growths and bushes attacked soon die.

This disease is under investigation at the present time, and at the moment little can be said definitely as to preventive measures. Care should be taken to obtain healthy stocks for planting, and if the disease appears in the plantation all affected portions of bushes and dead bushes should be removed and burnt as soon as detected.



(A) Charge Chamber ; (B) Steam Jacket ; (C) Goose Neck ; (D) Condenser ;
(E) Receiver.

Although a few growers have installed up-to-date cohobation stills, those usually employed are of simple construction, any fault in the distillate being subsequently rectified by fractional distillation.

The stills are constructed of copper, and generally built to take a charge of about 5 cwt. of flowers at a time. It is important to avoid burning, and the practice is to provide the stills with two chambers, with a perforated false bottom between, the lower chamber being filled with water, which should be as soft as possible.

Distillation is conducted by boiling the water beneath the charge with steam brought from a boiler to a coil, the top of which must be at least 1 ft. beneath the bottom of the charge chamber. The application of direct heat should be avoided. The oil flow from the condenser must be watched for, and complete distillation of the charge usually takes about 6 hours from the commencement of the flow.

On badly drained soils and soils with a deficiency of lime or chalk the roots of the bushes are often attacked by the mycelium of a fungus which penetrates to the main stems and ultimately causes their death.

The exact nature of this disease is obscure but it appears to depend very largely on soil conditions and is not very troublesome where the latter are favourable to the lavender.

No insect or other pests are known to attack lavender to any extent, but slugs often cause damage by eating away the young growths in the early summer.

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PAYMENTS IN KIND TO THE FARM WORKER.

UNDER varying names, such as "privileges," "perquisites," "extras," "gains," or "allowances," the old custom of making payment for services partly in kind instead of wholly in cash, continues to find favour amongst certain sections of the agricultural community in England and Wales.

The system can be traced back to early times when virgators and cottiers had by law to perform certain labour dues for their lords, for which, it is recorded in the thirteenth century, they "received a considerable part of their income in kind." By the sixteenth century the custom had further developed, and farm servants, and even in some instances day labourers, were allowed to board in the farmhouse, the provision of meals being reckoned as part payment of the worker's wage. Other allowances were frequently given, such as a house and garden, fuel, and especially beer and cider. The system of giving payment in kind gradually decayed, however, towards the end of the eighteenth century. Various causes led to a slow but general development which, with the exception of Northumberland and Westmorland, affected the whole of England and Wales, and by which farm servants were put as far as possible on money wages.

The general economic depression of the early part of the nineteenth century was doubtless considerably relieved by the provision of allotments as part payment. The provision of gardens followed and the tendency towards the payment of wages in kind, but on a more generous scale, was renewed. The Truck Act of 1831, which legislated for the prohibition of the payment of wages in goods or in kind to workers in certain industries.

specifically excluded servants in husbandry from its scope. The system was, no doubt, distinctly beneficial to the workers during the periods of high prices, but as it extended it became open to abuse by unscrupulous employers, and protests were frequent. By the Truck Act of 1887 it was made illegal to contract with a servant in husbandry for giving him intoxicating drink in addition to money wages as a remuneration for his services. This practice, even at the present time, is not extinct, although the custom has generally, except in the cider counties, given way to the payment of "beer money."

During the 10 years 1881-1891 there appears to have been a change for the better in the general conditions of agricultural labourers, partly owing to the increasing tendency to pay wages in money rather than in kind. By 1892 the majority of labourers in the low wage districts had allotments where they had not gardens. Lord Ernle wrote of 1888 that "few cases remain in which the want is not supplied." He estimated that three-fourths of the agricultural labourers, farm servants and cottagers in England and Wales had potato grounds, cow-runs, or field or garden allotments. Housing conditions were also reported to have improved.

From Mr. Wilson Fox's Report* relating to conditions in 1898 (issued in 1900), it is fairly clear that while the old abuses of the payment-in-kind system had been remedied to quite an extensive degree under the growing demands for payment in cash, the old customs were still largely practised and were dying very hard. In the northern counties the living-in system prevailed amongst married men, and most of the single men lodged and boarded in the farmhouses, frequently receiving as many as five meals a day. Breakfast, dinner and supper were the usual meals, but during harvest light refreshments, such as tea, coffee, milk, bread and cheese, and cake, known as "ten o'clocks," and "four o'clocks," or "lunches" and "drinkings" were provided, and after a few years it became a general practice to give them all the year round. In Yorkshire a similar position was found, the unmarried hired men usually being lodged and boarded ("meated") in the farmhouses or in the houses of the married foremen. The part of their wages due to them in cash was frequently advanced during the term as required and the balance settled on the expiration of the contract. Ordinary labourers received free cottages and potatoes and straw, and coals were carted and in some cases provided free. Northum-

* Report on Wages and Earnings of Agricultural Labourers. Cd. 346.

berland farmers frequently kept a cow for a worker for about 3s. per week.

The living-in custom prevailed in other areas: Cheshire, Derbyshire, the western side of Herefordshire, Monmouthshire, Shropshire, and Staffordshire, and occasionally in Cornwall, Devonshire and Rutland, although it is pointed out that the practice was rapidly declining in some of these areas. In Wales the greater number of farm workers lodged in the farmhouses or in adjacent outbuildings, or boarded in the farmhouse. The precise methods of providing food and lodging to workers lodging with the farm foreman in Yorkshire and in other areas where the custom existed (North Cambridgeshire, Lincolnshire, Nottingham and Rutland) varied in different counties. Sometimes the men bought their own food, which was cooked by the foreman's wife, while in other cases the foreman received extra wages from the employer or a supply of food such as pork, potatoes, vegetables, eggs, meal, wheat and fuel. The payment in kind to "confined men" in Lincolnshire and to married men in North Cambridgeshire and parts of Nottinghamshire included 20 to 30 stones of pork, several sacks of wheat or flour, and 40 to 60 stones of potatoes in addition to house and garden and the usual benefits. In the south the benefits provided to ordinary labourers were on a less lavish scale. They consisted of the provision of cottages, free or at a low rental, frequently with small gardens, rough firing or fuel carted free, milk, straw for pigs, sometimes potato ground, or potatoes, and despite the passing of the Truck Act, beer or cider, especially during hay and corn harvest. Food also was provided during the special seasons. The custom of giving Michaelmas money (which has since been ruled to be deferred payment of wages) was also largely practised.

In his second report,* which appeared in 1905 and relates to the year 1902, Mr. Wilson Fox gives tables of the average weekly earnings of agricultural labourers. The author states that "the figures now published for 1902 substantially apply to the years 1903 and 1904." An analysis of the figures shows that the value of payments in kind to farm workers in the south of England ranged up to one-fifth of the total wages. The Board of Trade inquiry† of 1907, dealing with the whole country, shows a greatly reduced proportion, while the figures obtained as the result of the Board of Agriculture inquiry of 1912 suggest

*Cd. 2376.

† Earnings and Hours of Labour.

a further decrease. In the *Labour Gazette*, July, 1917, reference is made to the Board of Trade figures of 1907, and it is stated that "so far as the Department is aware, the extra earnings (payment in kind, piece work, seasonal payments, etc.) had not varied to any appreciable extent up to the outbreak of war, although their value has probably increased appreciably at the present time."

This was the position when the Agricultural Wages Board was set up under the Corn Production Act of 1917. Unlike the Trade Boards Act of 1909, which made it obligatory on employers to pay the minimum rates fixed by the Board in cash clear of all deductions, the Corn Production Act empowered the Wages Board "to define the benefits and advantages which should be reckoned as part payment of wages in lieu of payment in cash and to fix valuations for such benefits."

Investigators reported very fully on the various practices of giving payment in kind, and showed fairly conclusively that the custom throughout the country had not appreciably changed since the investigation of 1898. In the northern counties and in Wales board and lodging were provided to yearly or half-yearly workers, either in the farmhouse or in the house of the farm foreman. It was found that the most common allowance was a cottage given either rent free or at a low customary rent ranging from 1s. to 3s. per week. The provision of potatoes or potato ground was also extensively practised. In most counties it was customary either to cart coal free from the pit or station or to allow the labourers to use the farmer's cart for carrying the coal in their own time. On colliery farms and in mining districts coal was provided or sold at a small cost, while in Lincolnshire it was reported that coal was given instead of beer at harvest or instead of potatoes. In some areas wood for fuel was given free or hauled free, and labourers in some districts were allowed to collect as much firing as they needed from the coppices and woods. Milk was nearly always given to cowmen and often to other workers. Manure was often allowed to labourers for their gardens or allotments. Bacon and pork were still given freely in Lincolnshire, the East Riding of Yorkshire and Nottinghamshire.

Amongst other allowances given at the time of the inquiry were extra food at harvest or at Christmas, joints when stock-killing, beer or cider (not frequent), rabbits for the catching, and vegetables. Sometimes a worker was allowed to plough his holding or allotment in his employer's time, while the keeping

of an animal for the use of stockmen was not an infrequent custom.

The Wages Board set up two committees: (1) A Cottages Committee, to consider the relation of the value of a cottage provided by the employer in connection with the payment of a minimum wage, and (2) an Allowances Committee, to consider and report what allowances (if any) should be recognised by the Board as benefits which might be reckoned in part payment of wages, and the maximum amount of any deduction in respect of their provision.

On the recommendation of the Cottages Committee the Board decided that a cottage should be recognised as part payment of wages, but that the deduction from the cash wage in respect of the provision of a cottage should not exceed 3s. per week inclusive of rates. In a few areas the maximum valuation for the purpose was reduced to 2s. 6d. or 2s.

The Allowances Committee finally recommended that in addition to a cottage, the provision of board, lodging, milk and potatoes, should also be recognised, the value of any farm produce to be reckoned at the wholesale price in the district. After prolonged discussion the Board accepted the Committee's proposals. Representations were made for the inclusion of potato ground, but it was argued that in view of the complications which would arise in the calculation of the value of any ground (being dependent on the soil, the amount of labour expended, the seeds, and the manure), it would be almost impossible to make any reliable valuation except by dealing with each case individually. Allowances of wood and fuel similarly did not present easy means of assessment and were precluded. The question of the supply of meals and board and lodging raised similar administrative obstacles, but it was realised that the protection afforded by the minimum wage could be weakened and perhaps nullified by the payment of full cash wages and the subsequent deduction of a disproportionate sum for these provisions, and it was therefore decided to recognise the provision of meals and lodging. With regard to the use or grant of stock or the provision of farm grazing, byre room or food for stock, the Board held, despite several objections from the District Committees, that it would not be desirable to include such provisions as recognised benefits, but it was pointed out that there would be no objection to an employer continuing the practice of providing the worker with a cow or sheep or accommodation or food for stock by making an arrangement (apart from the payment

of minimum rates in full) for the worker to pay for the use of stock at the value at which it had been customarily reckoned for that purpose. The custom particularly prevalent in Lincolnshire of supplying bacon or pork could not be recognised, being generally, like potato ground, a deferred and uncertain payment.

It eventually became necessary for the Wages Board to ignore the supply of unrecognised benefits and to insist strictly on payment of wages either wholly in cash or partly in cash and partly by the provision of the recognised allowances of board, lodging, cottage, milk or potatoes, valued at the rates fixed by the Board. This policy probably removed almost all the opportunities of abuse which had existed under the system of giving payment in kind. The system itself was regularised, and the workers were assured of a definite cash wage, the only deductions from which were in respect of certain specified benefits reckoned at fixed valuations.

Had the Wages Board been without power of legislation in respect of benefits and advantages it is probable that the increased value of remuneration in kind during the war would have led to a greater demand for allowances. The action of the Wages Board in confining the benefits which could be legally reckoned as part payment of minimum wages to the provision of a cottage, potatoes, milk, and board and lodging was generally to make these the only benefits provided. In certain instances, farmers continued extra old-time benefits such as fuel, rabbits, manure, vegetables, or straw, and efficient workers were sometimes rewarded by the use of a cow or by an allowance of butter, but it is thought that these additional allowances were quite exceptional.

With the exception of agriculture it has long been illegal under the Truck Acts in almost all industries to make deductions from a worker's wages in respect of goods provided, or to make payment otherwise than in cash, but the Truck Committee of 1908 in their Report make no recommendation for the extension of the Act to include workers in husbandry. From evidence given to the Foreign Office relating to 1907 it appears that in foreign countries and in the colonies agriculture is similarly excluded from any existing legislation as to truck. These facts, viewed in conjunction with the policy of the Agricultural Wages Board (which decided, despite general agreement on the principle of payment in cash as far as possible, to recognise certain benefits in part payment), indicate that the disadvantages and abuses of the system of payment in kind which

obtained in the case of workers in commercial and industrial enterprises, cannot apply to workers in agriculture. On the other hand, if the system is continued on the lines introduced by the Wages Board and now adopted by many Conciliation Committees by which allowances reckoned in part payment of wages are confined to benefits the values of which are easily assessable, it will no doubt continue to suit the convenience of both farmers and workers.

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THE Ministry of Agriculture announces the award of the following scholarships for the sons and daughters of agricultural

**Scholarships for
Children of Agri-
cultural Workers.**

workmen and others, in connection with the Scheme established under Section 3 of the Corn Production Acts (Repeal) Act, 1921 :—
Class I Scholarships, for three years, tenable at University Departments of Agriculture—

Mr. F. H. E. Beard, 24, Creswick Walk, London, N.W.11.
Miss Hilda Broadbent, 7, Moorlands Place, Halifax.
Mr. David S. Davies, Rhydywenol, Login, Carmarthenshire.
Mr. Evan E. Edwards, Esgair Farm, Borth, Tregaron, Cardigan.
Mr. George H. Lyon, Moor Farm, Sleaford, Lincs.
Miss Annie Newton, 1, Forest Rise, Whipps Cross, E.17.
Mr. Hugh G. Owen, Tyddyn Burn, Pentraeth, Anglesey.
Mr. Richard Roberts, Maesgraian, Trawsfynydd, N. Wales.
Mr. Frank R. Sanders, 23, Malmesbury Road, Chippenham.
Mr. Reginald W. Smith, 2, Ivy Terrace, Maney Row Green, Holypot, Berks.

Class II Scholarships, for two years, tenable at Agricultural Colleges—

Mr. William C. Collett, Church Lane, Weston-on-the-Green, Bicester, Oxon.
Miss Margaret L. Edwards, Fwrlode, Llanbedr, Crickhowell, Breckonshire.
Miss Isabel M. Hudson, 15, Glebe Terrace, Shirbeck, Boston, Lincs.
Miss Dorothy Kenyon, Mount Oswald, Pemmaenrhos, Old Colwyn.
Mr. Maurice B. Liller, Wereham, Stoke Ferry, Norfolk.
Miss Ethel E. Price, Penysheol, Llanishen, Chepstow, Mon.
Mr. Llewelyn Roberts, Wern Pontlyfni, Llanwnda, Carnarvonshire.
Mr. Donald Rowe, Garen, Lelant, Cornwall.
Mr. Sidney S. J. Travers, Hill Top, Kingsdown, Deal.

Class III Scholarships, for courses not exceeding one year, tenable at farm schools and similar institutions—

Eighty-nine scholarships have been granted, fifty-six to boys and thirty-three to girls for short courses in agriculture, horticulture, dairying, poultry-keeping, &c.

The occupations followed by the parents or guardians are :—Agricultural workmen, 21 ; working bailiffs, 6 ; small holders, 25 ; market gardeners, 3 ; working gardeners, 6 ; other rural occupations (e.g., harness maker, roadman, estate carpenter, village shopkeeper, etc.), 14. The remaining 33 scholarship holders were bona fide wage-earners in the agricultural industry, and of these the fathers of 23 are dead.

NOTES ON MANURES FOR SEPTEMBER.

SIR JOHN RUSSELL, D.Sc., F.R.S.,

Rothamsted Experimental Station, Harpenden, Herts.

General Scheme.—Before drawing up the fertiliser plan for the year it is necessary to frame a complete scheme of cropping and to decide exactly on what scale this is to be done. Certain crops must be liberally treated if they are to be grown at all, owing to the expense involved in their cultivation; others are less costly and can be treated more or less generously according to the prospects of the market. It is a safe rule that the farmer must be liberal to potatoes owing to the expense of their culture, and to mangolds by reason of the heavy yields they can give. On the other hand, it is unwise to overdo manuring for swedes unless one can expect a crop of 25 tons or more per acre; wheat, barley and oats may be well or poorly manured according to the funds available, but in any case economy in manure is not a wise procedure and is not to be recommended. Perhaps the safest rule that one can give is that if a crop is grown at all it should be grown well.

The basis of the manurial scheme must be farmyard manure and we must repeat and emphasise the advice given previously in these columns, that the manure drawn out into the field and there clamped should be given shelter from rain. A layer of earth 9 in. thick can be put on without great trouble and it saves a good deal of the value of the manure which otherwise would be wasted.

If it appears that there is insufficient farmyard manure to go round the whole of the break to which it is supplied there is the possibility of using various types of town refuse which are now available. Sewage sludge has some value which, however, is easily overrated; but if it can be obtained cheaply and worked easily into the soil it often gives good results. Ashpit refuse is also worth considering: at 3s. or 4s. on the field it is often quite good value to the farmer, though it would not usually be worth more than 6s. per ton. Some of the northern towns send out wastes or manures of considerable value. Manure which contains less than 1 per cent. of nitrogen is not likely to be worth more than about 8s. per ton on the farm.

Lime and Limestone.—Having settled the question of farm-yard manure the next point is to decide whether any of the fields want lime. It is comparatively easy at this time of the year to see if lime is lacking. If the clover in the seeds ley tends to fail or become patchy; if swedes and turnips are liable to finger-and-toe; if mayweed has spread among the corn; if dark green patches occur in the meadows and the clover begins to fail; or if any of the other crops become patchy, it is safe to assume that lime is required.

In this case two courses are possible. If no money is available for lime the field should be sown with a crop which can tolerate lack of this substance; of ordinary crops the most suitable are oats and potatoes, but there are also special crops, as rhubarb and celery, that are very suitable. In no circumstances should ordinary clover be sown; if the land must come into seeds, alsike should be substituted.

This, however, is only a temporary expedient and by far the best course is to apply lime. This can be supplied either as ground lime or quick lime, or as ground limestone or chalk. Lime should be used if it is desired to kill insect pests as well as to sweeten the soil, but limestone serves quite as well if the latter object alone has to be secured. There is an important difference in the composition of the two substances: 56 parts of ground lime serve the same purpose as 100 parts of ground limestone, so that if quick lime can be purchased at 30s. per ton the farmer should not pay more than 16s. 9d. per ton for ground limestone or 22s. 7d. for hydrate of lime.

It is usually the arable land that most needs lime; sown grassland often needs phosphates at least as much as lime and therefore should be treated with slag: only in exceptional cases need lime be given as well.

Manuring for Grass.—For the manuring of grassland, whether sown or not, it is essential to use phosphates, and these can be given as basic slag, superphosphate or mineral phosphates, whichever is found most suitable. At this season of the year the farmer has a considerable choice; if, however, the manuring of the grass is delayed too long the choice becomes more restricted. If the application is made in autumn some of the slow-acting phosphates, as low-soluble slag or finely-ground mineral phosphates, may be used on grass instead of the more soluble slag or superphosphate: the selection is largely a matter of price. Mineral phosphates should, however, be ground to pass the 120-mesh sieve, and not the 100-mesh sieve

adopted for basic slag. If, however, the manurial application is delayed till the spring the high soluble slag or superphosphate alone should be used.

The Manuring of Arable Crops.—In regard to arable crops potatoes and mangolds must, as already stated, be liberally treated; there should be a complete manure, and, in the case of mangolds, a dressing of salt as well. For potatoes a general recipe would be:—2 cwt. sulphate of ammonia, 3 cwt. superphosphate, and $1\frac{1}{2}$ cwt. sulphate of potash, with farmyard manure.

For mangolds the following may be used:— $1\frac{1}{2}$ cwt. nitrate of soda or nitrate of lime, $2\frac{1}{2}$ cwt. superphosphate, 3 cwt. French or German kainit, and 2 cwt. salt, with farmyard manure in addition.

These recipes, of course, require modification to suit local conditions. In regard to potatoes, muriate of potash usually gives the same yield as sulphate, but in some cases there is a falling off in quality. Kainit, however, should not be used other than in exceptional cases where it is known to be satisfactory.

Swedes in the south of England may be grown either with dung or with artificials, whichever is the more convenient, though in the drier districts it may be difficult to secure a good plant unless dung is used. If artificials are used they should contain a liberal proportion of phosphates and 1 cwt. or $1\frac{1}{2}$ cwt. of sulphate of ammonia, nitrate of soda or nitrate of lime.

Corn very often receives nothing in the way of manure, but this is not really a sound procedure. Barley in which seeds are to be sown should receive phosphates—superphosphate in the south country or basic slag in the western and northern parts of England. In some districts it is found that finely-ground mineral phosphates which have gone through the 120-mesh sieve are equally effective and cheaper; this is particularly the case in Northumberland. The advantage of the phosphate is seen in the additional yield or quality of barley and in the better take of the clovers.

Spring Dressings for Crops.—Finally, provision should be made for giving the corn crop spring dressings of nitrogenous manures. It is, however, impossible to foretell what dressings would be needed for this purpose, as this is largely influenced by the winter rainfall. A mild wet winter is a time of serious losses of nitrate on arable land, and these have to be made good before the winter corn can start into vigorous growth.

PRICES OF ARTIFICIAL MANURES.

NOTE.—Unless otherwise stated, prices are for not less than 2-ton lots f.o.r. in towns named, and are net cash for prompt delivery.

DESCRIPTION	Average Price per ton during week ending August 8th.				
	Bristol	Hull	L'pool	L'ndn	Cost per Unit at London
	£ s.	£ s.	£ s.	£ s.	s. d.
Nitrate of Soda (N. 15½ per cent.) ...	13.10	13.15	13.10	12.17	16. 7
" " Lime (N. 13 per cent.) ...	...	...	...	12.10	19. 3
Sulphate of Ammonia, ordinary (A. 25¼ per cent.)	13. 2*	13. 2*	13. 2*	13. 2*	(N)12. 7
" " " neutral (A. 25¼ per cent.)	14. 5*	14. 5*	14. 5*	14. 5*	(N)13. 5
Kainit (Pot. 12½ per cent.) ...	...	...	...	1.17	3. 0
" (Pot. 14 per cent.)• ...	2. 5	2. 1	2.10	2. 5	3. 3
Sylvinit (Pot. 20 per cent.) ...	...	...	...	2.12	2. 7
Potash Salts (Pot. 30 per cent.) ...	...	...	...	3.10	2. 4
" (Pot. 20 per cent.) ...	...	...	...	2.10	2. 6
Muriate of Potash (Pot. 50 per cent.) ...	9.10	7.10	8. 0	7. 0	2.10
Sulphate of Potash (Pot. 48 per cent.) ...	...	...	11.15	10.15	4. 6
Basic Slag (T.P. 35 per cent.) ...	...	...	...	3.12§	2. 1
" (T.P. 30 per cent.) ...	...	...	...	3. 0§	2. 0
" (T.P. 26 per cent.) ...	2.13§	2.10§	...	...	...
" (T.P. 24 per cent.) ...	2. 9§	2. 6§	2. 2§	...	...
" (T.P. 20-22 per cent.) ...	...	2. 3§	...	2. 7§	2. 4
" (T.P. 18 per cent.) ...	2. 3§	...	1.15§	...	...
Superphosphate (S.P. 35 per cent.) ...	4. 7	...	3.15§	3. 7	1.11
" (S.P. 30 per cent.) ...	3.17	3. 5	3. 7§	3. 0	2. 0
Bone Meal (T.P. 45 per cent.) ...	9.10	9.10†	8.15	8.10	...
Steamed Bone Flour (T.P. 60 per cent.) ...	8.10†	7. 2†	6.15	6.10	...
Fish Guano (A. 9-10, T.P. 16-20 per cent.)...	12.15	...	12. 5	13.12	...

Abbreviations: N.=Nitrogen; A.=Ammonia; S.P.=Soluble Phosphate; T.P.=Total Phosphate; Pot.=Potash.

* Delivered in 4-ton lots at purchaser's nearest railway station.

† Delivered (within a limited area) at purchaser's nearest railway station.

§ Prices include cost of carriage from works to town named. Hull prices include delivery to any station in Lincolnshire or Yorkshire; London prices include delivery within a limited area. Cost to purchasers in other districts will be greater or less according to the distance of different purchasers from the works.

MONTHLY NOTES ON FEEDING STUFFS.

E. T. HALNAN, M.A., Dip. Agric. (Cantab.),

Animal Nutrition Institute, Cambridge University.

Mineral Needs of Farm Stock.—In previous issues of this *Journal* attention has been drawn to the value of adding mineral mixtures to rations deficient in this respect, and stress has been laid on the necessity for a guarantee when purchasing such mineral substances that they are fit for feeding purposes. Products of this

DESCRIPTION.	Price per Qr.		Price per		Manurial Value per Ton.	Cost of Food Value per Ton.	Starch Equiv. per 100 lb.	Price per Unit, Starch Equiv.	Price per lb. Starch Equiv.
			Cwt.	Ton.					
	s.	lb.	s.	£ s.	£ s.	£ s.		s.	d.
Wheat, British - - -	—	—	12/6	12 10	0 15	11 15	71-6	3/3	1-74
Barley, British Feeding - -	—	—	9/3	9 5	0 12	8 13	71	2/5	1-29
„ Danubian „ - - -	29/6	400	8/3	8 5†	0 12	7 13	71	2/2	1-16
Oats, English Black and Grey - - -	—	—	9/8	9 13*	0 13	9 0	59-5	3/-	1-61
„ Scotch White - - -	—	—	12/8	12 13	0 13	12 0	59-5	4/-	2-14
„ Canadian No. 2 Western - - -	29/6	320	10/4	10 7	0 13	9 14	59-5	3/3	1-74
„ No. 3 - - -	28/6	—	10/-	10 0	0 13	9 7	59-5	3/2	1-70
„ Feed - - -	27/3	—	9/6	9 10	0 13	8 17	59-5	3/-	1-61
„ American - - -	25/9	—	9/-	9 0†	0 13	8 7	59-5	2/10	1-52
„ Argentine - - -	28/3	—	9/11	9 18	0 13	9 5	59-5	3/1	1-65
Maize, American - - -	40/-	480	9/4	9 7	0 13	8 14	81	2/2	1-16
„ Argentine - - -	41/-	—	9/7	9 12	0 13	8 19	81	2/3	1-20
Beans, Bangoon - - -	—	—	7/6	7 10†	1 11	5 19	67	1/9	0-94
Millers' offals:—									
Bran, British - - -	—	—	—	6 0	1 6	4 14	45	2/1	1-12
„ Broad - - -	—	—	—	7 0	1 6	5 14	45	2/6	1-34
Middlings, Fine, Imported - - -	—	—	—	9 17	1 2	8 15	72	2/5	1-29
Middlings, Coarse, British - - -	—	—	—	9 7	1 2	8 5	64	2/7	1-38
Pollards, Imported - - -	—	—	—	7 0	1 6	5 14	60	1/11	1-0
Meal:—									
Barley Meal - - -	—	—	—	9 12	0 12	9 0	71	2/8	1-34
Maize „ - - -	—	—	—	11 0	0 13	10 7	81	2/6	1-34
„ Germ Meal - - -	—	—	—	8 10	0 18	7 12	85-3	1/9	0-94
„ Gluten-feed - - -	—	—	—	8 15	1 6	7 9	75-6	2/-	1-07
Locust Bean Meal - - -	—	—	—	8 0	0 9	7 11	71-4	2/1	1-12
Bean Meal - - -	—	—	—	12 7	1 11	10 16	67	3/4	1-78
Fish „ - - -	—	—	—	16 5	4 6	11 19	53	4-6	2-41
Linseed - - -	—	—	—	19 0	1 10	17 10	119	2/11	1-56
„ Cake, English 9 ² / ₈ - - -	—	—	—	10 15	1 17	8 18	74	2/5	1-29
Cottonseed Cake, English 5 ¹ / ₂ - - -	—	—	—	7 2	1 14	5 8	42	2/7	1-38
„ „ Egyptian 5 ¹ / ₂ - - -	—	—	—	7 0	1 14	5 6	42	2/6	1-34
Decorticated Cottonseed Meal 7 ² / ₈ - - -	—	—	—	12 0†	2 13	9 7	71	2/8	1-43
Coconut Cake 6 ² / ₈ - - -	—	—	—	8 10	1 10	7 0	73	1/11	1-03
Ground Nut Cake 7 ² / ₈ - - -	—	—	—	8 10	1 15	6 15	56-8	2/5	1-29
Palm Kernel Cake 6 ² / ₈ - - -	—	—	—	5 17†	1 3	4 14	75	1/3	0-67
„ „ Meal 2 ² / ₈ - - -	—	—	—	4 17	1 4	3 13	71-3	1/-	0-54
Feeding Treacle - - -	—	—	—	5 10	0 8	5 2	51	2/-	1-07
Brewers' Grains:—									
Dried Ale - - -	—	—	—	6 7	1 4	5 3	49	2/1	1-12
„ Porter - - -	—	—	—	5 17	1 4	4 13	49	1/11	1-03
Wet Ale - - -	—	—	—	0 17	0 9	0 8	15	0/6	0-27
„ Porter - - -	—	—	—	0 15	0 9	0 6	15	0/5	0-23
Malt Culms - - -	—	—	—	8 0†	1 13	6 7	43	3/-	1-61

* New.

† At Liverpool.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of July and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative prices of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, suppose coconut cake is offered locally at £10 per ton. Its manurial value is £110s per ton. The food value per ton is therefore £8 10s per ton. Dividing this figure by 73, the starch equivalent of coconut cake as given in the table, the cost per unit of starch equivalent is 2s. 4d. Dividing this again by 224, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1¹/₂d. A similar calculation will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own market. The manurial value per ton figures are calculated on the basis of the following unit prices:—N, 12s. 7d.; P₂O₅, 4s. 4d.; K₂O, 2s. 4d.

nature are now available with this guarantee, and a Mr. F. E. Corrie has prepared a leaflet on "The Mineral Needs of Farm Stock," copies of which can be obtained free on application to Star Cottage, Lingfield, Surrey.

Fish Meal for Feeding.—A correspondent has written that the notes on this subject, which appeared in the August issue of this *Journal*, apparently condemned the use of fish meal for live stock. This is obviously not so, as mention is expressly made of the fact that fish meal, of the right kind, fed under proper conditions, is a perfectly sound and wholesome feeding stuff, but that taint will occur if fish meal rich in oil is fed, or if fish meal is fed in excessive quantity.

Use of Home-Grown Cereals for Feeding.—In this *Journal*, December, 1922, pp. 780 and 783 two articles were published on the use of home-grown wheat, oats and barley for live stock, and a leaflet was also issued. Farmers have now had time to put the advice contained therein to the practical test, and in view of the probability that a considerable proportion of home-grown cereals will be fed again this year, the writer would be glad if readers will communicate with him giving their experiences, and particularly mentioning any departures from the rules laid down in those articles, which they found necessary. Such letters addressed to the Secretary, Ministry of Agriculture, 10, Whitehall Place, S.W.1, do not require a stamp.

FARM VALUES.

CROPS.	Value per	Manurial	Food	Starch	Value	Market
	Ton on	Value per	Value per	Equivalent	per	Value per
	Farm.	Ton.	Ton.	per 100 lb.	unit	lb. S.E.
	£ s.	£ s.	£ s.		s. d.	d.
Wheat	8 10	0 15	7 15	71·6	2 2	1·16
Oats	7 2	0 13	6 9	59·5	2 2	1·16
Barley	8 6	0 12	7 14	71·0	2 2	1·16
Potatoes	2 2	0 3	1 19	18·0	2 2	1·16
Swedes	0 17	0 2	0 15	7·0	2 2	1·16
Mangolds	0 15	0 2	0 13	6·0	2 2	1·16
Good Meadow Hay	3 18	0 13	3 5	31·0	2 1	1·12
Good Oat Straw	2 1	0 6	1 15	17·0	2 1	1·12
Good Clover Hay	4 7	1 0	3 7	32·0	2 1	1·12
Vetch and Oat Silage	1 17	0 7	1 10	14·0	2 2	1·16

Use of the Tables.—The two tables given in this article, and which also appear every month, are intended as a guide to the economical purchase of feeding stuffs. In the large table a comparison is made of the cost per unit of feeding value of the different feeding stuffs offered for sale on the market, and the intending purchaser's attention is drawn to the most economical foods on offer. In the "Farm Values" table, the value per ton for feeding is given for the majority of the home-grown foods on a

strictly comparative basis with the cost of similar foods on offer in the open market. These "Farm Values" are of use when the farmer wishes to ascertain whether to sell his home-grown foods and purchase other foods, or whether to use his home-grown foods.

* * * * *

M. PIERRE ALSTEEN gave an account at the International Congress of Agriculture, held in Paris in May last, of the farm competitions held by the Agricultural League of the Province of Namur in 1920 and 1921. The province was divided into six districts according to the quality of the soil, and the competitions in each dealt

principally with the crop most typical in it, these comprising wheat, spelt, oats and potatoes. The societies in the district were informed during the preceding winter of the holding of the competitions, and at the beginning of June a first classification of the crops of their members was made by a Committee which was as far as possible unconnected with the district.

In accordance with the results of this first examination three classes of diplomas were awarded to the most successful members of each society. A competition between the different societies was then decided by a further examination of the crops belonging to their members which were placed highest in the first inspection. This was made by a Committee of State Agriculturists and a representative of the League, and money prizes were awarded to the successful societies. Such prizes, which vary from 200 to 750 francs, may not be distributed to their members but used for the purchase of implements for common use, improved seed, demonstration plots, etc. The societies are judged according to the following scale of points:—Number of members, 10; choice and treatment of seed, 20; manuring and freedom from disease, 20; cultivation and cleanliness of land, 20; appearance of crop and probable yield, 10; skill and knowledge of the cultivators, 10; general results, 10.

In the course of the two years' competitions more than 1,200 fields have been carefully examined by the judges and 91 societies participated.

Great improvements in the methods of cultivation followed have already been noticed. In each district the best farmers are brought into prominence; the best crops are distributed in the district for seed; the use of fertilisers is increasing and cultivation is more carefully carried out.

A FORWARD step of much interest and importance to the fruit growing industry, was taken by the Federation of British

**Fruit Growing
and the
Federation of
British Growers.**

Growers, when it decided to hold its annual meeting in a fruit growing district and pay visits to fruit plantations in the neighbourhood. By such visits growers are brought into direct contact with the methods and views, successes and failures of their fellow growers under conditions which may differ widely from their own, but from which, nevertheless, the most valuable lessons may be learned. More than a hundred growers from the important fruit growing counties met at Cambridge on 29th May for the first of these visits, and the interest displayed and the keen discussion aroused ensure the annual repetition of such a useful event.

The first visit was to the small apple plantation of Mr. J. G. Faircliffe, Burwell, which embodies the results of twenty years' experience in the combination of fruit and poultry. There is little depth of soil over the chalk, and the fruit consists chiefly of Lane's Prince Albert and Worcester Pearmain on paradise, planted 8 ft. apart each way, and closely spur pruned on a long spur system. The plantation is in its thirteenth year and is divided up into pens of 10 or 12 rods each, most of which contain 10 laying hens while the remainder are reserved for chicken rearing. The poultry keep down the grass and no cultivation, spraying or manuring is done. The party was much struck both by the method of pruning and the absence of damage by pests. That the latter was not mere chance was shown by the presence of a moderate supply of the usual varieties of pests.

The party then proceeded to Burwell Fen where the plantations of Mr. R. Stephenson are managed by Mr. Faircliffe. These extend to 85 acres, the land varying from heavy clay at one end to peat at the other. The area was formerly down to asparagus, but is now under apples with some plums. The chief varieties are Emneth Early, Lane's Prince Albert, Worcester Pearmain, Grenadier, Lord Derby, Bramley Seedling and Newton Wonder. The first three are closely spur pruned on Mr. Faircliffe's system, the severity of which may be gauged by the fact that the varieties are almost indistinguishable in shape from each other in winter. The next two varieties are spurred every other year, and the last two are allowed to go except for thinning. The land became foul during the war and

all but 5 acres is now being grazed by pigs, which were started four years ago. No cultivation or manuring is done but the trees are regularly sprayed. In spite of some damage from insect attack and severe frosts, there appeared to be a promise of a fair crop of the earlier varieties. At neither of these places was the foliage up to its usual high standard, but it has to be remembered that the fen winter in May is a serious enemy. The cold store in course of construction near a private railway line was also inspected.

The next visit was to 50 acres of fruit grown on heavy land by Messrs. Robert Ingle, at Kingston. The area was planted 15 years ago with apples, plums, bush fruit and strawberries. The chief interest was centred in the black currents, which had leaves of French type, though the growth of the bush and the fruit was typical of Baldwin. The stock came from France some years ago.

At Croxton Park the party was entertained to tea by Lady Newton in the absence of Sir Douglas Newton, K.B.E., President of the Federation. The fruit farm of nearly 100 acres of heavy clay land has been planted during the last 14 years with apples, pears, plums, bush fruit and strawberries. The visitors were much impressed by the clean condition of the land and still more by the clean condition of the trees, due to early and adequate spraying.

After dinner at Cambridge, Mr. W. G. Lobjoit (Controller of Horticulture) said the Federation was fortunate in having at its disposal the services of Sir Douglas Newton as President and Mr. Seabrook as Vice-President. It was now able to speak with quite respectable weight of numbers in the councils of the nation. He referred to the Federation scheme of grading and packing which the Ministry was assisting through its officers and those of the County Councils. An American grader had been purchased and would be at the disposal of growers. He congratulated them on what had been done and felt there never was a time when co-operation and combination were so essential to deal with commercial questions.

Mr. Seabrook in reply said that Sir Douglas Newton was absent on their business in the House of Commons. The Federation had marked time during the reorganisation, but was now making rapid progress and could be said really to represent the industry. Mr. Stephenson on behalf of the West Cambs. Fruit Growers' Association welcomed the members of

the Federation and regretted that their visit should have taken place in such a bad year.

Early the next morning the party saw a film made on the farms of Messrs. Seabrook & Sons, depicting all the operations of a fruit farm, from the propagation and planting of the tree, to the grading and packing of the fruit and its departure by motor lorry.

The party, conveyed in three char-a-bancs and eleven motor cars, then proceeded to visit some of the smallholders of Cambridgeshire. The plantation of Mr. F. L. Handley, Cottenham, of two acres of strawberries and young trees on heavy wet clay, was greatly admired for its fine tilth and the healthy appearance of the strawberries, which were almost as good as one could wish to see. This was especially remarkable as the land was practically derelict for 4 years while the holder was on active service. Mr. C. T. Chivers, Cottenham, was then visited. This plantation consists of top fruit with gooseberries under, on the famous greensand soil of the district. This was a good sample of the best methods in the district and the freedom from pests, cleanness of the land and promise of a crop were greatly admired.

Another good plantation seen was that of Mr. J. R. Smith, Willingham. Great interest was taken in the young trees of Bramley Seedling, Newton Wonder and James Grieve, pruned under the direction of Mr. A. T. Paskett (Cambs. County Horticultural Adviser).

The next visit was to a young 20-acre plantation, belonging to Mr. J. P. Pentelow, J.P., at Somersham (Hunts). This consisted of young apples, pears and plums pruned under the advice of Mr. F. Tunnington (Hunts County Horticultural Adviser). The under crops were gooseberries, currants, raspberries and strawberries, all doing very well—especially the gooseberries and strawberries.

The party then made for Wisbech where they were welcomed by Mr. W. C. Selby on behalf of the Wisbech Fruit Growers' Association at lunch. Mr. H. V. Taylor (Deputy Controller of Horticulture) expressed the thanks of the whole party to those growers who had so kindly thrown their plantations open to inspection, and Messrs. J. P. Pentelow, J.P., E. Sandall and E. C. Gardiner replied.

A brief inspection was made of the 30-acre plantation of Messrs. Gardiner Bros. Contrary to the usual Wisbech prac-

tice, dessert as well as cooking varieties of apples are grown and the trees are closely spur pruned. Remarkably regular crops are obtained under this system, even on Bramley Seedling.

After tea at Wisbech, the return to Cambridge was made under arctic conditions, so that growers from the west and south thought the Fenlanders must be a hardy race. After dinner Mr. T. W. Attwood, President of the New Zealand Fruit Growers' Federation, gave an informal address. He urged the vital necessity for organisation as the foundation of successful marketing, and growers were especially interested in the method of collecting funds to support the organisation, which is undertaken by Government.

The majority of the party accepted the invitation of Mr. W. P. Seabrook to visit the extensive plantations and nurseries of his firm at Boreham, Essex. On arrival the growers saw an American "Cutler" grader at work, driven by electricity. This is the first machine introduced into this country which grades by weight—the only method which gives perfect satisfaction when the apples are to be packed in boxes. A small hand dusting machine from which the dust is driven out by a revolving fan also aroused great interest. The home plantations consist chiefly of apples, Cox's Orange Pippin and Worcester Pearmain, the latter especially promising a heavy crop. After being entertained to lunch, the party made a tour of the nursery stock. Toppinghoe Hall was then visited where all varieties of hardy fruit are grown, and especial interest was displayed in the black currants and cordon apples.

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THE *Revue de Zoologie Agricole* for August, 1922, contains a full account of the outbreak of the Colorado Beetle in

**The Colorado
Beetle in
France.**

France and the measures that are being taken for its suppression. In view of the danger of its introduction into this country the following summary should be of value to potato growers.

On 9th June, 1922, M. Mondon, President of the Agricultural Union of Taillon, saw on the leaves of his potatoes numerous red larvæ of an entirely new appearance, subsequently identified as those of the Colorado Beetle. Inquiring further he found that several adjacent fields were similarly affected and that in some the crops were already lost. It was then proved that this pest already existed over an area of more

than 100 square miles to the north-west of Bordeaux. The centre of infestation appeared to be near the village of Sénéjac where the larvæ had been seen in July, 1921, and it was supposed that the insect was accidentally introduced at this point in 1919 or 1920 with merchandise imported from America. The development of the affected patch was more accentuated towards the south, and this appeared to be accounted for by the predominance of northerly winds in May and June at the period when the beetles' longest flights usually take place. At the time of discovery the wind had already spread the insect far across the pine region, where the warm and sandy soil seemed specially favourable to it and there were many wild *Solanaceæ* (plants of the potato family) capable of serving as food for it. It had also spread towards the north, and to the west until stopped by the sea. Road and rail transport may have also done their share in assisting the spread. To the east very little extension was observed.

Many outbreaks were stamped out in a short time by measures varying according to the case, from simple collecting of the insects to the destruction of the crops. Other infested areas, where the only measure undertaken was arsenical spraying, are still not free. Preventive measures were carried out with care in several Communes where equipment for the purpose was set up by the local authorities, but wherever defence measures were left to the initiative of the cultivators they lacked uniformity and were altogether insufficient. By July, 1922, however, a special fund of 500,000 francs was voted by the French Chamber for combating the pest, and regulations were made by the French Ministry of Agriculture (a) prohibiting the importation of potatoes from the U.S.A. and Canada and prescribing the inspection of other vegetables, and (b) prohibiting the transport of potatoes and tomatoes, the boxes, etc., used for carrying them, and also manures, etc., from infected to uninfected districts.

Control Measures.—The article goes on to state that the measures that can be taken against the beetle differ according to the firmness with which it has become established. Where, as in the United States, eradication is now hopeless the means available for keeping it in check are (1) the encouragement of natural enemies, (2) insecticides (arsenates or Paris green) applied as a spray or in powder, and (3) cultural practices—winter ploughing to expose the hidden insects, etc.

Previously in Europe the situation has been different. The beetle has hitherto been discovered on a small area soon after its arrival and the object has been to prevent it spreading and to exterminate it as quickly as possible. The affected plot has been isolated; all the perfect insects, their eggs and larvæ, or possibly the whole crop, collected, and drenched with paraffin or benzol; and the soil turned and liberally moistened with the same products.

The outbreak in France, however, presents a new problem. The present infestation when discovered had already spread over an area of more than 100 square miles, and it was therefore too late to take drastic action. A full account is given in the article of the measures now being taken in France. The importation of potatoes from the United States and Canada is prohibited and other vegetables and fruit from the same source are inspected. An infected zone and a protective zone have been delimited, and the transport of potatoes, tomatoes, egg-plants, packages, etc., prohibited. In the protective zone cultivators are required to spray, and in the infected zone to apply any other measures prescribed. Over the whole extent of the territory the declaration of all plots planted with potatoes is obligatory.

It is pointed out that whether there is merely a danger in an uninfected country of the importation of the pest, or whether there is already a considerable infestation, the first essential defence is propaganda, in order to make known to cultivators the appearance of the beetle and its harmfulness, and to bring home to them the necessity of declaring its presence when found and either taking, or submitting to, the necessary remedies. Its existence must be discovered as quickly as possible wherever it occurs, so as to keep the centres of infection as small as possible and enable it to be stamped out. The pest is stated to have been allowed to spread by the ignorance or indifference of cultivators, or even through their evading declaration of its presence, through mistrust of the measures that may be taken to destroy it. The distribution of leaflets with coloured illustrations is advocated, and the exhibition of specimens in a frame on the walls of meeting rooms and local offices. Teachers can also contribute by directing the attention of their pupils to the pictures and inducing them to bring specimens of all insects found in potato fields.

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THE following statement deals with the acreage under crops and numbers of live stock in England and Wales on 4th June,

**Agricultural
Returns,
England and
Wales, 1923.**

1923 :—

The preliminary tabulation of the Agricultural Returns collected on the 4th June, 1923, in respect of agricultural holdings above one acre in England and Wales shows that the total area under crops and grass is 25,941,000 acres, comprising 11,182,000 acres of arable land and 14,759,000 acres of permanent grass. The total area of crops and grass shows a reduction of 85,000 acres on last year's figures, but the area returned as rough grazings is 78,000 acres more than in 1922, so that the net reduction in the area of land coming within the scope of these Returns is thus 7,000 acres. All classes of live stock except horses show an increase.

As compared with 1922, the arable area has fallen by 129,000 acres, while permanent grass shows an increase of 44,000 acres. The reduction in the arable area is mainly accounted for by the corn, pulse and potato crops.

Cereals.—The total area under the three chief cereals, including mixed corn, is 5,162,000 acres, or 458,000 acres less than in 1922. All three cereals have declined, wheat by 226,000 acres, barley by 35,000 acres, and oats by 190,000 acres. The area of wheat is the lowest since 1913, but is about the average of the ten years 1905-1914. The barley area is larger than in 1915, but with the exception of that year, is the lowest on record. The area under oats is practically the same as in 1913 and rather larger than in 1914.

Beans and Peas.—The area of beans at 234,000 acres and of peas at 141,000 acres, show substantial reductions of 50,000 acres and 32,000 acres respectively on last year's figures. The area of beans is the smallest during the last twenty years, excepting that of 1917, while apart from the war period the area of peas is the lowest on record.

Potatoes.—The total area of potatoes 467,000 acres, is 94,000 acres less than in 1922. There has been a reduction in all parts of the country, consequent on the poor financial results of last year's prolific crop, but this year's area is still larger than in any year before the war.

Roots.—The area returned as under turnips and swedes is 861,000 acres, this being 40,000 acres more than in 1922. The area of mangolds, however, at 403,000 acres shows a decline of 20,000 acres, but with the exception of 1922 is the largest since 1915.

Fruit.—The area of orchards is returned at 232,000 acres or 12,000 acres more than in 1920. Small fruit, however, shows a decline, this year's area of 68,700 acres being 11,000 acres less than in 1922, though it is larger than in the two years 1919 and 1920. Small fruit is grown largely in orchards, and although growers are asked to show figures for small fruit separately in the Return, it is possible that this may not have been done very exactly in all cases.

Other Crops.—The area of other crops has, on the whole, declined, this being mainly due to a large reduction of nearly 50,000 acres in the case of vetches or tares. Mustard and lucerne both show relatively large increases, and there is a notable increase in the area of sugar beet, which is twice that of last year. Hops show a decline of 1,600 acres.

Clover and Rotation Grasses.—The area of clover and rotation grasses was greatly reduced last year owing to the failure of the 1921 sowings. That loss has now been recovered, and this year's area of 2,601,000 acres is the largest since 1911. The area of these crops which is reserved for hay is 287,000 acres greater than in 1922, which more than makes up the small decline of 58,000 acres in the area of permanent grass for mowing.

Horses.—The number of horses on agricultural holdings has again fallen, the total of 1,281,000 this year being 59,000 less than in 1922. The decline in breeding continues, the number under one year old being only 66,000, or 18,000 less than last year.

Cattle.—The total number of cattle at 5,822,000 is 100,000 more than in 1922, and is now back to the pre-war level. Cows and heifers in milk or in calf number 2,614,000, or 92,000 more than in 1922, and this year's total is the highest on record. The number of calves is 29,000 less than last year, this, no doubt, being partly due to the heavy fall which was recorded last year in the number of heifers in calf. That fall, however, has practically been recovered this year.

Sheep.—The total number of sheep is 13,832,000, or 394,000 more than in 1922, when a fall of practically the same number was recorded. The number of breeding ewes has again improved, this year by 69,000, and the satisfactory prices both for mutton and wool which have been ruling this season may lead to a further increase in flocks.

Pigs.—Pig breeding and feeding has been fairly remunerative since last year, and the number of pigs shows the large increase

PRELIMINARY STATEMENT of Acreage under CROPS and GRASS and
Numbers of LIVE STOCK in England and Wales on 4th June, 1923.

DISTRIBUTION.	1923.	1922.	INCREASE.		DECREASE.	
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Per Cent.</i>	<i>Acres.</i>	<i>Per Cent.</i>
TOTAL ACREAGE under all CROPS and GRASS	25,941,000	26,026,000	—	—	85,000	0·3
ROUGH GRAZINGS	4,859,000	4,781,000	78,000	1·6	—	—
ARABLE LAND	11,182,000	11,211,000	—	—	129,000	1·1
PERMANENT GRASS { For Hay	4,355,000	4,418,000	—	—	63,000	1·3
Not for Hay	10,404,000	10,802,000	102,000	1·0	—	—
TOTAL	14,759,000	14,716,000	44,000	0·3	—	—
Wheat	1,741,000	1,897,000	—	—	226,000	11·5
Barley	1,329,000	1,564,000	—	—	35,000	2·8
Oats	1,974,000	2,164,000	—	—	130,000	8·8
Mixed Corn	118,200	126,200	—	—	7,000	5·6
Rye	73,700	84,600	—	—	10,900	12·9
Beans	234,300	285,000	—	—	50,700	17·4
Peas	114,400	173,600	—	—	32,200	18·6
Potatoes	466,700	661,200	—	—	94,500	16·8
Turnips and Swedes	861,400	821,100	40,300	4·9	19,700	4·7
Mangold	402,900	422,800	—	—	1,100	1·5
Cabbage, Savoys and Kale	72,200	73,300	—	—	3,300	20·4
Kohl-rabi	12,900	16,200	—	—	—	—
Rape	77,900	75,200	2,700	3·6	—	—
Vetches or Tares	86,700	136,200	—	—	49,500	36·5
Lucerne	57,900	50,600	7,300	14·4	—	—
Mustard	52,900	39,600	13,300	33·6	—	—
Brussels Sprouts	16,900	15,000	1,900	12·7	—	—
Cauliflower or Broccoli	11,200	10,500	700	6·7	—	—
Carrots	10,100	14,100	—	—	4,000	28·4
Onions	2,400	3,800	—	—	1,200	33·3
Sugar Beet	17,000	8,400	8,600	102·4	—	—
Linseed	8,900	4,800	4,100	85·4	—	—
Hops	24,900	26,500	—	—	1,600	6·0
Small Fruit	63,700	74,700	—	—	11,000	14·7
Orchards	231,900	220,000	11,900	5·4	—	—
CLOVER and ROTATION { For Hay	1,815,000	1,828,000	287,000	18·8	—	—
Not for Hay	788,000	778,000	11,000	1·4	—	—
TOTAL	2,601,000	2,303,000	298,000	12·9	—	—
BARE FALLOW	435,300	406,000	30,300	7·5	—	—

LIVE STOCK.

	<i>No.</i>	<i>No.</i>	<i>No.</i>	<i>Per Cent.</i>	<i>No.</i>	<i>Per Cent.</i>
Horses used for Agricultural purposes (including Mares for Breeding)	798,000	805,100	—	—	7,100	0·9
Unbroken Horses	—	—	—	—	—	—
One year and above	207,400	230,600	—	—	23,200	10·1
Under one year	66,200	83,900	—	—	17,700	21·1
Other Horses	209,600	220,900	—	—	11,300	5·1
TOTAL OF HORSES	1,281,200	1,340,500	—	—	59,300	4·4
Cows and Heifers in Milk	1,974,500	1,834,000	40,500	2·1	—	—
Cows in Calf, but not in Milk	269,000	288,600	—	—	19,600	6·8
Heifers in Calf	371,000	293,300	71,700	24·0	—	—
Other Cattle:—Two years and above	1,018,200	922,900	95,300	10·3	—	—
One year and under two	1,108,000	1,167,100	—	—	59,100	5·1
Under one year	1,061,400	1,110,800	—	—	29,400	2·6
TOTAL OF CATTLE	5,822,100	5,727,700	99,400	1·7	—	—
Ewes kept for Breeding	5,497,200	5,428,100	69,100	1·3	—	—
Other Sheep:—One year and above	2,541,300	2,289,900	251,400	11·0	—	—
Under one year	5,793,300	5,720,000	73,300	1·3	—	—
TOTAL OF SHEEP	13,831,800	13,438,000	393,800	2·9	—	—
Sows kept for Breeding	388,400	302,000	86,400	29·8	—	—
Other Pigs	2,223,000	1,996,900	226,100	11·3	—	—
TOTAL OF PIGS	2,611,400	2,298,900	312,500	13·6	—	—

* Mountain, Heath, Moor, Down and other rough land used for grazing.

† In addition there were 4,900 acres of beans and peas grown for fodder in 1923.

‡ As returned on 4th June, 1920.

of 312,000. This year's total of 2,611,000 is the highest since 1911. The number of sows kept for breeding is 388,000 or more than 25 per cent. above last year's figure, and is the largest recorded since 1895.

ACREAGE OF HOPS.

PRELIMINARY STATEMENT compiled from the Returns collected on the 4th June, 1923, showing the ACREAGE under HOPS in each COUNTY of ENGLAND in which Hops were grown, with a COMPARATIVE STATEMENT for the Years 1922 and 1921.

COUNTIES, &C.				1923.	1922.	1921.
				Acres.	Acres.	Acres.
* KENT ...	{	East ...	...	3,540	4,100	4,010
		Mid ...	...	5,200	5,530	5,410
		Weald ...	...	6,710	7,110	6,630
		Total, Kent ...		15,450	16,740	16,050
HANTS ...	...	...	...	1,020	1,070	1,010
HEREFORD ...	...	...	...	3,890	3,950	3,520
SURREY ...	...	...	...	210	220	200
SUSSEX ...	...	...	...	2,270	2,350	2,270
WORCESTER ...	...	...	...	1,950	2,030	1,950
OTHER COUNTIES	...	...	...	100	90	90
Total ...				24,890	26,450	25,130

THE Agricultural Organiser for Buckinghamshire (Mr. John Porter, B.Sc.) reports that Yellow Rattle (*Rhinanthus Crista-galli*, L.) was abundant in the meadows this year, and at one centre the horse-sprayer was used. In addition, plots were laid off to test finely-ground kainit, sulphate of ammonia, etc., applied in the dry state when the leaves were wet.

Where the full-strength sulphate of ammonia spray* was used the results were highly satisfactory, the Yellow Rattle being killed out. Fortunately, the red clover was very little damaged. With regard to the kainit, etc., applied in the dry state, these were only partially effective. This may be due partly to the leaves of Yellow Rattle not being sufficiently wet to hold the dry powder and partly to imperfect distribution by hand. On those plots where the leaves were sufficiently wet and the distribution was uniform both sulphate of ammonia and finely-ground kainit proved effective in reducing the weed. Yellow Rattle is dealt with in the Ministry's Leaflet No. 251.

* 2 cwt. to 50 gal. water per acre.

ALL growers of potatoes who wish to sell any part of their produce for seed are reminded that potatoes sold for planting in

**Wart Disease
of Potatoes
Order, 1923.**

England and Wales must be officially certified either—(a) as having been grown on land free from Wart Disease, or (b) as having been inspected and found to be free from the disease, or (c) as being of an approved immune variety true to type.

As regards potatoes grown in England and Wales the certificates will be issued by the Ministry. The necessary inspections may be made by an Inspector of the Ministry or by some competent person previously approved by the Ministry.

When potatoes are sold for planting, the seller must furnish the buyer with the number of the certificate relating to the potatoes sold. In order to assist both buyers and sellers of potatoes, it has been arranged that the certificate numbers shall have prefixes as follows:—

C.L. (=clean land) for potatoes grown in clean districts or from crops which have been inspected and on which no Wart disease has been found; and

T.S. (=true stocks) for approved immune varieties which have been inspected and found to be true to type.

The letter A will be used in addition for potatoes grown in an infected area, and the certificates for such potatoes will thus have numbers prefixed by A.C.L. or A.T.S.

Certificates will not be required by a grower who wishes to plant seed saved from the crop grown in the previous year on the same premises.

Growers who intend to sell seed potatoes must make early application to the Ministry for the necessary certificates. Growers of immune varieties should apply for inspection of their crops whilst growing, in order that they may obtain the certificate necessary to enable the potatoes to be planted in infected land. If the crop is not inspected only a "C.L." or "A.C.L." certificate can be issued, and the seed will not be allowed to be planted in infected land. It will be necessary in districts in and near infected areas for crops of susceptible varieties also to be inspected before a "C.L." or "A.C.L." certificate can be issued.

The Ministry will be prepared to arrange for the necessary inspections, the fee for which will be 2s. 6d. per acre or part of an acre. No charge will be made for the issue of certificates where no inspection by the Ministry's officers is entailed.

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THERE have been great developments in the poultry industry since the war, and it is being more and more realised that, in

Poultry-keeping: view of the enormous imports of eggs and
Volume of poultry from abroad, there is ample room
Leaflets. for its further expansion. In keeping
 poultry for profit, it should be realised that

prices are tending to fall, and it is essential that sound practical and business methods should be adopted if profitable results are to be expected.

To assist poultry-keepers and others with the best general advice that is procurable the Ministry of Agriculture has issued its collected leaflets and has included with poultry those on other small live stock, pigeons, rabbits and goats. The information given in these leaflets is based on sound knowledge and experience, but is in most cases only intended to serve as an introduction to the various subjects dealt with. Poultry-keepers in country districts should remember that in most counties in England and Wales there is a County Poultry Instructor who has been appointed to assist poultry-keepers in the county to overcome their practical difficulties. Should the services of the instructor be desired, a communication should be sent to the County Agricultural Organiser, who may usually be addressed at the County Offices. Amateurs in cities and suburban districts are recommended to join the local poultry society, if there is one.

The volume is to be obtained on application to the Ministry's Office at 10, Whitehall Place, S.W.1, price 1s., post free.

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A ONE-DAY poultry conference will be held at the Midland Agricultural and Dairy College, Sutton Bonington, Lough-

**Midland
 Agricultural
 College Poultry
 Conference.**

borough, on Tuesday, 25th September, 1923. Short papers will be read on "Some Aspects of Poultry Nutrition," by Capt. E. T. Halnan; "Chicken Rearing," by George A. Palmer; "Breeding for Egg Production," by Tom Newman; Naked Eye Characteristics of Diseases—a demonstration by Capt. J. P. Rice. Lunch and tea will be provided at the College. Farmers, poultry keepers, and others interested in poultry keeping are cordially invited to attend. Further particulars can be had on application to the Principal of the College.

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THE Ministry of Agriculture and Fisheries desires to give notice that new regulations have been issued by the Canadian

**New Canadian
Plant Import
Regulations.**

Government governing the entry of nursery stock and plants into the Dominion. The regulations, so far as concerns produce from England and Wales, come into force on the

1st of September, and may be summarised as follows:—

The term "plant" or "plants" includes all members of the vegetable kingdom and any plant or product of a plant. The term "nursery stock" includes all plants for ornamental purposes or propagation. Seeds and seed potatoes are not included.

All shipments of nursery stock imported into Canada from this country must be accompanied by a certificate of inspection and a permit must be obtained by the importer. An official certificate must accompany the invoice and a copy of this certificate must be attached to each container. These certificates must be issued and signed by an authorised official, and must state that the nursery stock covered by the certificate has been duly examined by him and has been found apparently free from any pest or disease. Each container must also be clearly marked with the names and addresses of the consignor and consignee and the port of entry; in addition, a declaration showing the quantity, kind and value of the nursery stock contained therein, must be affixed. Nursery stock will only be admitted through the following ports: Niagara Falls, Ont., St. John, N.B., Montreal, Que., and Vancouver, B.C. Nursery stock will also be liable to inspection at the port of entry, and if found to be infected with any pest or disease, to protective treatment or destruction. The importation of nursery stock into Canada through the mails is prohibited. The importation of potatoes is prohibited, as also is the importation of the following species of the genus *Pinus* and horticultural varieties, namely:—White Pine (*Pinus Strobus* L.); Western White Pine (*Pinus monticola* Dougl.); Sugar Pine (*Pinus Lambertiana* Dougl.); Stone or Cembrian Pine (*Pinus Cembra* L.); and all other five-leaved species of the genus *Pinus*: all species and varieties of currants and gooseberries (*Ribes* and *Grossularia*) but not including the fruits of the latter, European Buckthorn (*Rhamnus cathartica* L.) and Common or Rust Barberry (*Berberis vulgaris* L.) and their hybrids and horticultural varieties: also all species and varieties of *Berberis* and *Odostemon* (*Mahonia*) susceptible to Crown Rust of Oats and Black-stem Rust of Wheat respectively, including *B. Amurensis* Rupr.; *B. aristata* D.C.; *B. Canadensis*

Pursh.: *B. ilicifolia* Forst.; *B. Lycium* Royle; *B. Nepalensis* Spreng.; *B. Sibirica* Pall.; *O. Aquifolium* Rydb. and all species and varieties of the genera *Pseudotsuga*, *Tsuga* and *Larix*.

The Ministry is prepared to arrange for the necessary examination and certification of consignments on payment of a fee at the rate of 2 guineas per day for each inspector. The minimum fee charged will be 1 guinea. Special arrangements will be made for the inspection of small consignments at the Ministry's office.

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REPLIES TO CORRESPONDENTS.

Feeding; Wet Brewers' Grains to Milch Cows.—D.U. asks whether the feeding of wet brewers' grains to milch cows increases or diminishes the milk or cream.

Reply: The use of wet brewers' grains increases the yield of milk, but if fed excessively tends to diminish the percentage of cream contained therein. Information as to the feeding of wet grains is given on p. 3 of Leaflet No. 388.

Willow Beetle.—F.W. & S. sent a specimen of Golden Willow attacked by beetles (no other variety damaged) and asked for means of control.

Reply: The willow you enclose is badly attacked by the common Willow Beetle, dealt with in Leaflet No. 301.

In regard to measures of control, a thorough spraying with a wash containing nicotine appears to give the best results. A formula for preparing such a spray is given in the Leaflet. It is essential to spray the plants very thoroughly and if beds are rapidly re-infested from neighbouring plantations it may be necessary to spray a second time in order to kill the beetle grubs.

This particular kind of beetle appears to attack almost exclusively rods of the *viminialis* section, seldom if ever damaging such *triandra* varieties as Black Maul or Champion Rod.

Pests in Grass and Meadow Land.—T.L.J. asks for information as to pests killing grass in meadow-land, for identification and control measures.

Reply: The insects involved are Aphides, or Green Fly, of a different species, but similar to those attacking roses, fruits trees and other plants.

From the specimens enclosed, however it is apparent that the Aphides have been subject themselves to attack by parasites—in fact the parasitised specimens are in the great majority. These can be readily detected as they are the dried, globular bodies attached to the grass and from which the black Hymenopterous flies which have parasitised them are now emerging. These parasitised specimens are quite different in appearance from the green, living Aphides, which have not been so attacked.

The parasites being so much in evidence, it is extremely likely that the greatest amount of damage has now been done and the attack, as such, will have practically died out. Any control measures, therefore, would probably do more harm than good as the beneficial parasites would fall victims in greater numbers than the Aphides, any of which now remaining are likely to become the prey of the first generation of parasites now emerging.

It is highly improbable that the presence of these insects upon the grass would have any deleterious effect upon grazing cattle.

Lettuce Disease.—G.C.M. asked early in May for information on a disease occurring in patches among lettuces, and the methods of control.

Reply: The lettuce is attacked by the fungus *Marssonina panattoniana*, which is sometimes very destructive, especially in houses. It is much assisted out of doors by, damp muggy conditions—in fact, the same conditions that favour *Botrytis*.

Sulphur is indicated as a preventive, and all cultural conditions that tend towards less moisture and more ventilation are recommended. Growers in America have found using a system of sub-irrigation instead of overhead watering of assistance, but of course this only applies in certain cases. (An article on this disease appeared in this *Journal*, May, 1923, p. 147.)

Bladder Plum Disease.—Mrs. M. wishes to know the cause of and the remedy for the Bladder Plum disease, two of her young damson trees being badly attacked, and another slightly.

Reply: The Ministry has not published a leaflet on this disease, which does not cause serious damage, though it is said to be common in certain parts of the west of England. In Worcestershire Plum Pockets occur chiefly on the varieties Victoria and Czar, but less frequently on the Yellow Pershore. The Mycelium of the fungus (*Euxoa pruni*) is perennial in the wood, and plum pockets occur each year, though with varying abundance. They are said to be more prevalent when fine warm weather follows the flowering period.

As to control, the only method that can be recommended is to cut out the affected parts. The shoot should be cut out a foot or eighteen inches below the diseased plum, to try and get rid of the perennial mycelium above referred to.

Currant Clearwing Moth.—C.W.V. sent in April specimen Red Currant Twigs containing larvæ and asked for the pest to be identified, and what treatment should be applied.

Reply: The currant twigs are suffering from the attacks of the Currant Clearwing Moth. The eggs of this insect are laid in the shoots and the caterpillars on hatching bore into the stem, feeding within the pith, and eventually killing the shoot. Treating with caustic winter wash would be of no value as the caterpillars live beyond the reach of any insecticide. The only method of dealing with the pest is to prune away all weakly and dying branches or shoots, the prunings being burnt. In cutting back branches, care should always be taken to cut to healthy wood, that is to say, to cut beyond the ending of the tunnel made by the pest.

American Sweet Clover.—D.W. asks for information about this plant.

Reply: There is a biennial variety of *Melilotus alba* known in this country as Bokhara Clover. A Canadian strain is referred to in this *Journal*, September, 1921, p. 554. There is also an annual variety, which, under the name of Hubam Clover has lately been attracting considerable attention in America. See this *Journal*, March, 1923, p. 1152. It is recommended that trials of either, if made, should be on a small scale at first.

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Foot-and-Mouth Disease.—*Yorkshire, East Riding.*—No. further outbreak occurred in this district subsequent to that at Skeffling on 29th June last, and the general restrictions on the movement of animals in the locality were withdrawn on 27th July.

Bedfordshire.—Following the outbreak on 3rd July at Stevington near Bedford, 16 further cases of the disease have been confirmed in the County of Bedford, the last of which was on 3rd August. All of these were within the area originally scheduled by the Ministry. In consequence it has not been practicable to proceed very rapidly with the modification of the restrictions imposed on the movement of animals in the district surrounding the original outbreak, but the area affected by these restrictions has been reduced to one of approximately 10 miles radius round Renhold, in which parish the majority of the later outbreaks in this county were located.

Hampshire and Surrey.—On 25th July a fresh case of the disease was discovered at East Worldham, near Alton, Hampshire, on premises from which animals had on the previous day been sent to Guildford Market for sale. These animals were traced to their destinations (a slaughterhouse in Guildford and a railway truck at Walton-on-Thames) and were found to be also affected with disease. Restrictions on the movement of animals were consequently applied firstly to an area of 15 miles radius round East Worldham, and secondly to an area of 20 miles radius round Guildford, in order to cover the possible distribution of disease from Guildford Market.

As regards Hampshire there have been 8 further outbreaks of the disease within a few miles of the original case at East Worldham, the latest of which occurred on 10th August.

In Surrey there have been no cases of the disease discovered except in the animals which were sent from East Worldham to Guildford Market and are referred to above.

Certain portions of the area surrounding Guildford, which included parts of the Counties of Sussex, Berkshire and Buckinghamshire were released from restrictions on 8th August, and the restrictions have since been removed except in respect of small areas surrounding Alton and Guildford.

Leaflets issued by the Ministry.—Since the date of the list given on page 377 of the July issue of the *Journal*, the following leaflets have been revised.

- No. 21.—The Warble Fly.
- „ 295.—Marketing of Eggs.
- „ 366.—The Manufacture of Whey Butter.

The following Leaflets have been re-written.

- No. 114.—The Scientific Principles of Feeding Poultry.
- „ 317.—The Rearing of Chickens.

